

# NETWORK WORLD

The Newsweekly of Enterprise Network Strategies

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## Consortium to shape fate of AppleTalk

By Maureen Molloy  
Senior Writer

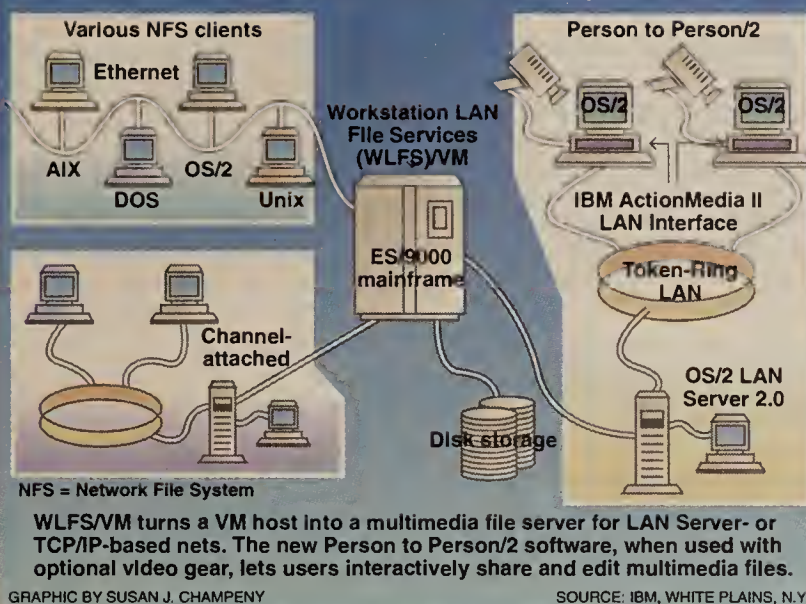
CUPERTINO, Calif. — Apple Computer, Inc. and a group of internetwork vendors next month will announce the formation of a consortium whose goal will be to make AppleTalk a more robust protocol for enterprise nets.

The group will address vexing issues regarding use of AppleTalk in large router-based internets, such as the protocol's inordinate use of costly bandwidth, inefficient path selection and poor congestion management capabilities.

"AppleTalk has the most deficiencies [of any protocol] when routing over the wide area since it was intended for small work groups," said Nick Lippis, a principal at Strategic Networks Consulting, Inc. in Rockland, Mass. "If this new forum can get those issues resolved more quickly, it will go a long way in serving user needs."

In addition to Apple, the consortium's roster will include router vendors Cayman Systems, Inc.,  
(continued on page 79)

## IBM makes multimedia push



## ISDN steals spotlight as TRIP '92 gets under way

By Bob Wallace  
Senior Editor

RESTON, Va. — The Corporation for Open Systems International (COS) and Bell Communications Research this week will activate a transcontinental Integrated Services Digital Network here that will link over 150 ISDN sites in an unprecedented show of user support for the technology.

The Transcontinental ISDN Project (TRIP) '92 is the culmination of years of work by COS,

Bellcore and all sectors of the ISDN industry, including users, switch suppliers, equipment vendors and carriers.

TRIP '92 is intended to show users that ISDN offerings from multiple suppliers can interoperate using National ISDN 1, an emerging ISDN specification. The event, along with the National ISDN 1 net it will leave in place, is designed to boost interest in and use of the technology.

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## Multimedia storm to sweep over Las Vegas

IBM, Microsoft, Lotus, HP and others unwrap multimedia products in advance of Comdex/Fall.

By Michael Cooney  
and Joanne Cummings  
Network World Staff

LAS VEGAS — Setting the stage and perhaps the tone for Comdex/Fall here this week, IBM, Hewlett-Packard Co., Microsoft Corp. and Lotus Development Corp. announced multimedia wares on the eve of the show.

HP last week unwrapped software that allows Transmission Control Protocol/Internet Protocol-based workstations to engage in multimedia conferences (see "HP joins multimedia blitz," page 97), while Microsoft and Lotus introduced products that enable Windows-based applications to support video (see "Lotus and Microsoft face off in multimedia market," page 4).

IBM made a full-scale assault on the market by launching products designed to let users begin building distributed multimedia networks and bolstered that with the release of a white paper outlining its longer term multimedia plans (see "IBM shares support plan for distributed multimedia,"

page 4).

IBM's new products, which include software to turn VM mainframes into multimedia servers and a local-area network-based  
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### FEATURES



■ Special issue delves into client/server migration planning. Page 63.

### NETLINE



**WIRELESS LAN** supporters jump all over FCC plan for personal communications service. Page 2.

**100M BIT/SEC ETHERNET** backers present technical details of their plans to the IEEE 802.3 Committee. Page 2.

**IN A PORTABILITY PLAY**, Sprint releases reduced rates, discounts and lower cost fea-

tures for its Clarity 800 service. Page 2.

**SYBASE, TIVOLI TEAM** to address systems administration in distributed database environments. Page 6.

**BORLAND LINES UP** support from IBM, Novell, other vendors for a data access API it is pushing as a de facto standard. Page 6.

## Unsuspecting NetWare users uncover a dirty little secret

By Joanne Cummings  
Senior Writer

You may not know it, but you could be running a stolen copy of NetWare.

There is a quiet but persistent problem involving value-added resellers and consultants that sell users illegal copies of Novell, Inc.'s NetWare. The value-added reseller buys a single copy and installs it at multiple user sites.

If you don't inter-network two servers bearing the same identification number or upgrade the network operating system, you may never

learn about the problem.

Sometimes the only way to discover you have an illegal copy of NetWare is to call Novell for service and learn your copy is registered to someone else. You could be held liable unless you can prove you paid for the software.

The problem isn't unique to Novell, but it occurs more frequently among NetWare users simply because of Novell's wide market share. And it doesn't affect only unsophisticated customers. Even major companies may find that  
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NETWORK WORLD'S



READER ADVOCACY FORCE

## Workstation rivals duel over servers

By Jim Duffy  
Senior Editor

In a high-technology version of "Super Tuesday," three workstation giants last week raised the price/performance ante with the introduction of powerful new Reduced Instruction Set Computing (RISC) servers.

Digital Equipment Corp., Hewlett-Packard Co. and workstation market leader Sun Microsystems, Inc. tried to steal one another's thunder last Tuesday with claims of top-of-the-line processing power and cut-rate prices for their new servers (see "Sun's 20-processor server aimed at downsized apps," page 4).

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# Wireless supporters say more PCS spectrum needed

FCC wrestles with bandwidth allocation; MCI and others urge agency to revise licensing procedures.

By Ellen Messmer  
Senior Correspondent

WASHINGTON, D.C. — Vendors and others last week barged the Federal Communications Commission with advice on how to jump-start the personal communications service (PCS) business, making it clear they think the FCC is going about it the wrong way.

The Wireless Information Networks (WIN) Forum, which includes three dozen leading computer and internetworking vendors, said the FCC's PCS plan will not be adequate for wireless local-area networks.

In addition, MCI Communications Corp. said PCS spectrum licensing will proceed faster if the FCC selects three national consortia of PCS carriers — one of which MCI wants to head up — rather than hundreds of individual companies serving regional markets, as is the case in the cellular telephone industry today.

PCS, also known as personal communications network, is an emerging low-power microcell-based wireless technology that supports high-bandwidth applications in the 1,850-MHz to 2,200-MHz range. In the 2-GHz

(continued on page 96)

# HP, AT&T introduce new 100M bit/sec LAN scheme

Tout improvements over traditional Ethernet.

By Joanne Cummings  
and Caryn Gillooly  
Network World Staff

SAN DIEGO — As expected, Hewlett-Packard Co. and AT&T Microelectronics last week laid out a plan for a next-generation Ethernet that is not only 10 times faster than today's Ethernets, but also offers other improvements.

In a presentation before the IEEE 802.3 Committee, the companies detailed their technical scheme — called 100Base-Voice Grade (VG) — for running Ethernet at 100M bit/sec over the same wiring and using the same packet sizes as 10Base-T Ethernets.

The plan calls for a modified media access control (MAC) protocol, which would eliminate the use of carrier-sense multiple access with collision detection (CSMA/CD) and would improve on traditional Ethernet by providing guaranteed bandwidth to the desktop and enhanced link security, HP claimed.

Because the plan is so different from traditional Ethernet, many attendees questioned whether it fell under the auspices of the Ethernet standards committee. "In essence, we're proposing that we evolve the 802.3

(continued on page 96)

# Sprint offers 800 discounts as era of portability nears

By Bob Wallace  
Senior Editor

WASHINGTON, D.C. — With the deadline for 800 portability looming, Sprint Corp. last week announced a package of reduced rates, discounts and lower cost features aimed at boosting the appeal of its Clarity 800 service.

As its name implies, the Sprint Clarity Call Center package is targeted squarely at call centers, which the carrier said accounts for 70% of 800 calling. The package will be followed by special plans for firms that use 800 service for intracompany calling, transaction processing and cus-

tomers service applications.

According to Sprint, the package goes beyond the discounts AT&T and MCI Communications Corp. are relying heavily on to keep current 800 users and win new customers when 800-number portability becomes a reality ("Carriers plot strategies at dawn of war over 800 users," NW, Nov. 9).

The Sprint package includes reduced off-peak calling rates, free installation of Dialed Number Identification Service (DNIS), discounts on real-time automatic number identification

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## Briefs

**Cabletron to air strategy, team with Fore.** Cabletron Systems, Inc., a Rochester, N.H., hub vendor, this week will spell out its two-year vision. As part of a five-pronged announcement, Cabletron will discuss its next-generation hub architecture, which will largely reflect its Asynchronous Transfer Mode (ATM) strategy. New details of that strategy will include an alliance with ATM switch vendor Fore Systems, Inc., sources said.

**IBM routes through new channel.** IBM last week said it will make its 6611 Network Processor available through OEM channels. Analysts said the move will help IBM establish a foothold in a router market dominated by Cisco Systems, Inc. and Wellfleet Communications, Inc. The move also represents IBM Networking Systems' continued drive to become a major networking OEM player. IBM earlier this year said it expects Networking Systems OEM sales to contribute \$50 million to IBM's bottom line in 1992.

**Carriers to build undersea fiber system.** AT&T and 55 other carriers from 40 countries last week announced Columbus-II, a \$360 million undersea fiber system that will link the U.S., Europe and Latin America. It will link Palermo, Italy; Funchal, Portugal; St. Thomas, U.S. Virgin Islands; West Palm Beach, Fla.; and Cancun, Mexico. Service on the system will begin in December 1994.

**Westinghouse Communications to launch frame relay.** As expected, Westinghouse Communications this week will announce it will soon begin offering a public frame relay service based on Telematics International, Inc. packet switches. In a related development, Telematics this week will announce it is building a family of Asynchronous Transfer Mode switches, including customer premises, concentration and backbone access products.

**Rolling Stone.** In a blow to Digital Equipment Corp., David Stone, vice-president of DEC's Software Products Group, resigned to become president of AT&T's Operations Systems Business Unit, which develops software for telecommunications and data network products. Stone, a 22-year veteran, was the chief strategist behind DEC's Network Application Support initiative and was instrumental in forging ties with Microsoft Corp. Observers said Stone's role was diminished when Robert Palmer became president and chief executive officer.

**Almost very fast.** AT&T Paradyne last week introduced a 28.8K bit/sec modem designed to migrate users to the CCITT V.fast standard. AT&T Paradyne stopped short of claiming V.fast compliance, though, citing the instability of the standard. The company did, however, submit its 28.8K bit/sec test results to the Consultative Committee for International Telephony and Telegraphy for consideration in the V.fast standard. The modem will be available in the second half of 1993. Pricing was not disclosed, but the company said users of its Comsphere 3800 devices can upgrade to V.fast for \$350.

**AT&T announces fax options.** AT&T last week announced international facsimile service options for users of its Pro WATS and CustomNet calling plans. The options, AT&T Pro FAX Service and AT&T CustomNet FAX Service, require separate access lines, are billed in six-second increments with a 30-second minimum and carry a \$10 monthly charge. Faxes can be sent to more than 200 locations worldwide.

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## Multimedia storms Vegas

*continued from page 1*

multimedia conferencing system, will let users build networks capable of supporting applications such as desktop training videos.

For the mainframe, IBM announced an enhanced version of its client/server-based Workstation LAN File Services (WLFS)/VM to support the large files associated with video.

Like the current version, WLFS/VM Version 1.1 runs as an application under VM, turning the host into a file server for LANs running the company's OS/2 LAN Server or TCP/IP. Adding video support essentially turns the host into a multimedia server.

WLFS/VM includes a software component for the OS/2 LAN Server or TCP/IP Unix Network File System server that, working with WLFS/VM, lets users store large files such as full-motion video files on the VM mainframe and download them to the server. From there, the OS/2 LAN Server or TCP/IP server can distribute the files over the LAN.

This was made possible by redesigning the current version to improve data flow control and file handling capabilities. The new version also has an increased buffer size, enabling it to handle larger multimedia files as a single object.

Version 1.1 can retrieve large files from direct-access storage devices and move them through the mainframe and onto the LAN faster than Version 1.0, IBM said. The vendor did not disclose any performance details, however.

Version 1.1 adds support for

high-speed T-1 and T-3 links, meaning the host server can be accessed from remote locations. In the past, WLFS/VM only recognized mainframe channel-attached servers.

WLFS/VM is being used in a corporate video education trial Ameritech and Andersen Consulting are conducting in Chicago. In the trial, Ameritech's WLFS/VM mainframe sends sales and training text, voice and video over T-1 and T-3 lines to 12 corporate sites. Andersen Consulting is using Ameritech's system to experiment with consumer-interactive video services at department stores.

WLFS/VM is available for \$12,000, or \$250 per server. IBM hinted that an MVS version might be available in the future.

Another component of IBM's multimedia thrust is its Person to Person/2 conferencing software. The software, which runs on a personal computer under OS/2, enables as many as five concurrent networked users to interactively share and edit files. With a full-motion video option and IBM's ActionMedia II LAN boards and camera, customers can also incorporate full-motion video into the conference.

Files to be shared can be stored on individual workstations or a WLFS/VM mainframe. IBM said future versions will run on its RISC System/6000 under AIX as well as on Apple Computer, Inc. Macintoshes.

The software is designed to run on either Token-Ring Networks or Ethernet LANs, or over asynchronous or Basic Rate Interface Integrated Services Digital Network wide-area links. It supports both Network Basic I/O System and TCP/IP transports.

Barry Evers, market planner for IBM's development organization at Hursley Labs in the U.K., said users at workstations configured with Person to Person/2 use a menu-driven interface to set up a phone book within the application and initiate a conference.

Once connected, they can bring a report, graphic, spread-

sheet or other document into a window within the Person to Person/2 application. This window, called a chalkboard, lets users view documents and annotate them as the conference progresses. The software also lets users transfer copies of the original files to various participants.

Evers said the products, when used with the video option, enable users to view any participants they choose as the conference progresses. The viewed participant's image appears in a window on the computer screen. The system does not yet support voice, so a separate audioconference must be established.

IBM said several vendors have committed to building applications to IBM's Person to Person/2 application program interface. Among them are Lotus, which pledged to build a copy of its Notes work group software that would enable customers to use Person to Person/2 without exiting their application.

BT also stated it is developing a video compression board for the software that will perform the same functions as IBM's Digital Video Interactive (DVI)-based ActionMedia board but will adhere to the emerging H.320 standard. Pacific Bell and Bell Atlantic Corp. said they are going to incorporate the technology into their ISDN offerings.

Person to Person/2 is expected to be available in February. It will cost \$1,875 for a 10-user license without the full-motion video option, which costs about \$200 per user plus \$2,000 for the ActionMedia II board. Users must also purchase a camera.

The key strategy in IBM's announcements is its focus on using the network to deliver multimedia applications, analysts said.

"Networking is what's going to make multimedia work in the office," said Nick Arnett, president of Multimedia Computer Corp., a consultancy in Campbell, Calif. "The information we need is growing faster than our ability to deal with it, and IBM sees that networking is the answer." □

## IBM shares support plan for distributed multimedia

Position paper details IBM's multimedia strategy.

By Joanne Cummings  
Senior Writer

WHITE PLAINS, N.Y. — IBM unveiled a position paper last week detailing its vision for bringing multimedia support into distributed computing environments.

The paper, titled "Multimedia Distributed Computing: IBM's Directions for Multimedia Distributed Systems," focuses on several areas in which IBM plans to offer products or enhance existing systems to support distributed multimedia network architectures.

IBM intends to provide innovations in: multimedia worksta-

tions, operating system and presentation services, application tools and services, data services, networking, systems management, servers and standards.

In the paper, IBM said, among other things, it intends to offer:

■ **Presentation services.** It will provide a multimedia programming interface, called Multimedia Presentation Manager (MMPM/2), for its OS/2 and AIX/6000 operating systems that would enable OS/2 and eventually AIX applications to control multimedia devices.

It will also provide application *(continued on page 97)*

## Lotus and Microsoft face off in multimedia market

By Wayne Eckerson  
and Timothy O'Brien  
Network World Staff

Microsoft Corp. and Lotus Development Corp. last week expanded their turf wars into the field of multimedia by introducing products that allow Microsoft Windows-based applications to support video.

Microsoft introduced Video for Windows, software that allows Intel Corp. 386 or 486 computers to integrate video into Windows applications, and Lotus announced Version 2.0 of Freelance Graphics for Windows, which enables users to embed voice, video and animation into business presentations.

Microsoft Chairman Bill Gates, who announced Video for Windows at a press conference in San Francisco, said the product uses new software from Intel called Indeo that provides either

software- or hardware-accelerated digital video compression/decompression.

Although digital video has been available on desktop computers for years, its acceptance has been slow due to the cost and incompatibilities of the various add-on cards needed for video.

Video for Windows is a software-driven playback video solution that has tools for running, incorporating, editing and creating compressed digital video.

The software supports 320 by 240 pixel image resolution at up to 24 frames per second, and Gates said the throughput of most local-area networks will support these types of files.

Video for Windows uses a common file format for video information called Audio Visual Interleaved. Additionally, it includes a standard interface for video-capable *(continued on page 93)*

## Sun's 20-processor server aimed at downsized apps

By Caryn Gillooly  
Senior Editor

MOUNTAIN VIEW, Calif. — Sun Microsystems, Inc. last week made what analysts labeled as its first all-out push into commercial accounts with the release of the SPARCcenter 2000, a 20-processor machine designed to handle downsized applications.

Sun also announced that the leading relational database ven-

dors and a handful of system administration tool vendors have agreed to make their products available for the new platform. The company created a new group called SunIntegration Services to help customers migrate to the system.

"Their intent here is to get themselves into the corporate mainstream, which they haven't been too successful in up until

now," said Lynn Berg, program director, mid-range computing strategies at Gartner Group, Inc., a research and consulting company based in Stamford, Conn.

"They're making the right moves," she said. "They're beefing up the real hand-holding support, they're working with database and third-party vendors, and they continue to be aggressive from a pricing standpoint."

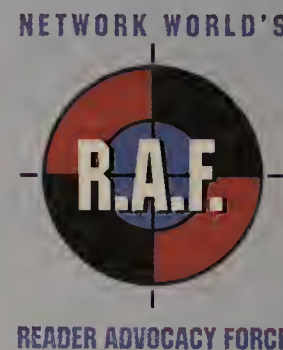
Larry Hambly, vice-president of marketing at Sun, based here, said, "With the SPARCcenter 2000 server, we are aiming at organizations that need the pro-

*(continued on page 93)*

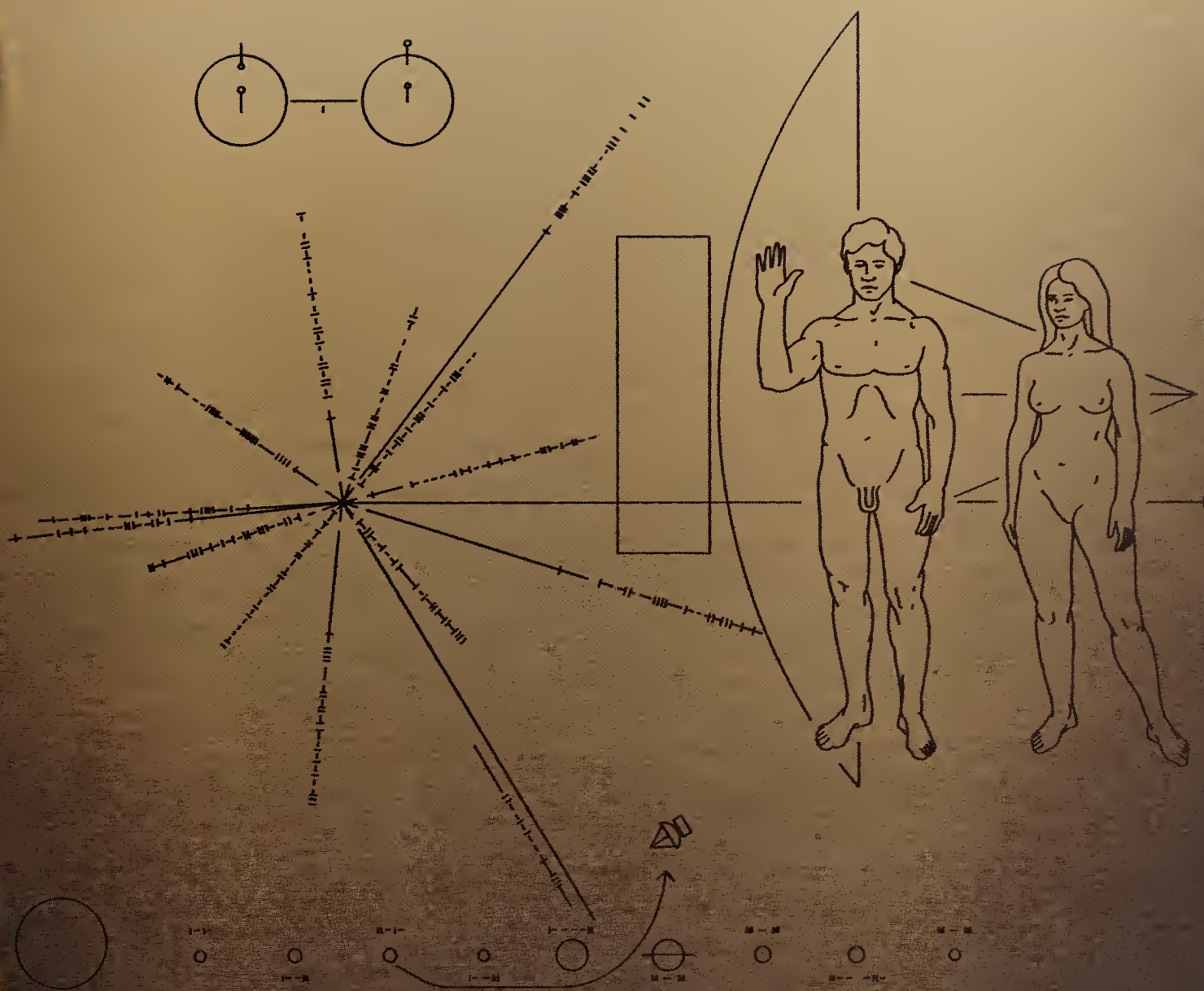
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CISCO SYSTEMS



# Sybase, Tivoli partner to develop mgmt. apps for distributed nets

By Timothy O'Brien  
West Coast Bureau Chief

SAN FRANCISCO — At a strategy briefing here, Sybase, Inc. last week announced the signing of an agreement with Tivoli Systems, Inc. to address systems administration in distributed database environments.

Under the agreement, Sybase is licensing Tivoli Systems' Advanced Development Environment (Tivoli/ADE) tool kit and will work with Tivoli to integrate system and database administration capabilities in products for managing applications in distributed computing environments.

"We are pleased to be working with Tivoli to integrate the management of distributed operating systems and distributed databases into a unified environment," said Stewart Schuster, vice-president of marketing at Sybase.

Tivoli's object-oriented systems administration technology has been adopted by both the Open Software Foundation, Inc. (OSF) and Unix International, Inc. as base technologies in their respective distributed management systems, the Distributed Management Environment (DME) and UI-Atlas.

At last week's strategy briefing, Sybase

introduced its Control Server products, which are designed to provide mainframe class control for distributed database environments. The Control Server product family includes SA Companion, SQL Monitor, Configurator and Backup Server.

The Control Server is just one component of the new System 10 product family Sybase announced at the strategy briefing. System 10 also includes the next version of SQL Server, the so-called Navigation and Replication Servers and the OmniSQL Gateway for multivendor SQL integration ("Sybase details new tools to deploy client/server apps," *NW*, Nov. 9).

Schuster said the administration of distributed database environments is one of the industry's next big challenges.

Neither company was ready to provide details on specific products or pricing in the agreement. But Sybase said it tapped Tivoli to help provide the framework technology for future standards-based distributed database management products. It said Tivoli can help add functionality for supporting environments such as OSF's DME, which are beyond the initial scope of the Control Server products.

Of the Control Server products, only the SA Companion is currently available. The remaining Control Server products will be available in 1993 as a part of Sybase's new System 10 product family. **□**



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## Borland finds allies in battle for database API

By Wayne Eckerson  
Senior Editor

LAS VEGAS — Several vendors, including IBM, Novell, Inc. and WordPerfect Corp., are expected to announce this week at Comdex/Fall support for a standard data access API being put forth by Borland International, Inc.

The vendors are rallying behind Borland's application program interface in an effort to create an industry-standard mechanism for accessing multivendor databases from multiple client platforms.

However, many analysts said the advent of a database API that competes with Microsoft Corp.'s Open Database Connectivity (ODBC) standard will cause considerable confusion among users and will slow the process of achieving a standard method for accessing data sources.

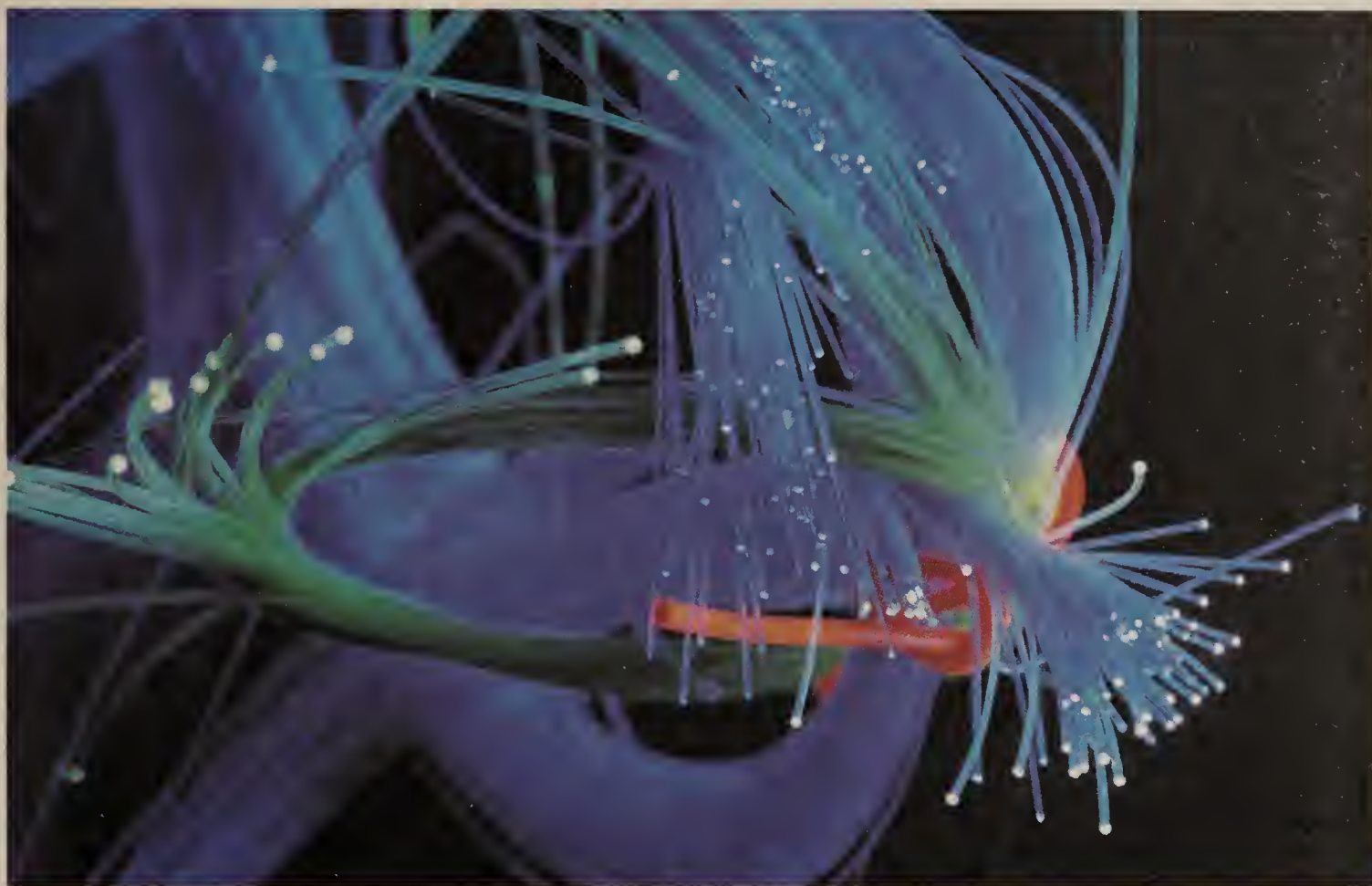
Phillipe Kahn, chairman and chief executive officer at Borland, told *Network World* the new API will be called the Integrated Database API (IDAPI). According to sources, IDAPI is a slightly modified version of the Open Database API previewed by Borland earlier this year.

Based on the SQL Access Group's (SAG) Call-Level Interface (CLI), IDAPI will provide both an SQL and record-oriented interface for accessing relational databases and file systems from multiple client platforms. It will also handle Binary Large Object (BLOB) data types, allowing IDAPI to provide access to object-oriented databases.

*(continued on page 97)*

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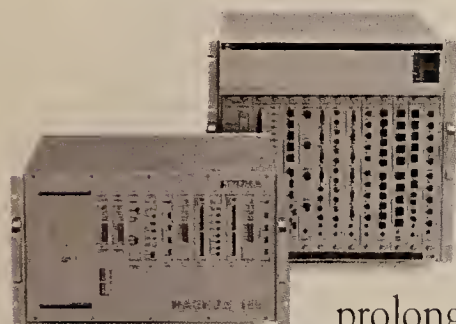


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## THE PAINLESS PILGRIMAGE FROM ANALOG TO DIGITAL

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TA120	Terminal Adapter	2 Ch. @ 64K 1 Ch. @ 16K	ISDN	Supports Voice & Data
TA220	Terminal Adapter	2 Ch. @ 64K 1 Ch. @ 16K	ISDN	Combines "B" Channels
FT100S	DSU/CSU	56K-1.544Mb	T1/ Frac. T1	Single Port
FT100	DSU/CSU	56K-1.544Mb	T1/ Frac. T1	Dual Port (Expandable)
DDS/MR1	DSU/CSU	56 Kbps	DDS	All DDS Rates
DDS/V.32	DSU with V.32 Modem	56 Kbps	DDS/ Analog	Auto-dial Backup
T1-ESF-CSU	CSU	1.544 Mbps	T1	ESF & D4 Framing
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#### 4. Purchase influence/number of sites

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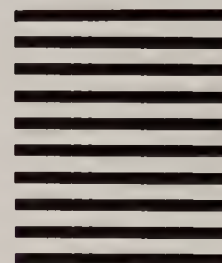
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# DATA NET ARCHITECTURES

NETWORK ARCHITECTURES, DATA NETWORK EQUIPMENT, STANDARDS AND ENTERPRISE NETWORK MANAGEMENT

## Worth Noting

**M**ore than 80% of the 250 respondents to a recent Business Research Group survey said they plan to pump more data traffic over wide-area networks in the next two years, putting more pressure on carriers to provide broadband services such as Asynchronous Transfer Mode to accommodate the increased load.

## Data Packets

**Digital Communications Associates, Inc.** announced Version 2.0 of its CrossTalk asynchronous communications software for Microsoft Corp. Windows. It lets users open and run multiple communications sessions simultaneously. It also lets users quickly log on to on-line services and automate communications sessions and file transfers.

CrossTalk for Windows 2.0 will be available later this month. It is priced at \$195.

**ZyXEL USA** of Anaheim, Calif., has brought out a modem that allows users to transfer files over cellular networks at 9.6K bit/sec.

ZyXEL's cellular modem incorporates a data pump designed to overcome limitations inherent in data transmission over cellular nets.

The ZyXEL cellular modem is available now as a \$200 option when purchased with ZyXEL's U+ modem series. It can work with any MS-DOS, Windows, OS/2, Macintosh or Unix personal computer, laptop or palmtop computer. ■

## DEC's Polycenter Common Agent for Ultrix

Provides a common set of services for managing Ultrix systems and applications in a network.

Offers a consistent interface between managed objects and Digital Equipment Corp. management systems. The interface can also support other management protocols.

Includes a developers' tool kit for customizing system and application management.

Prices for base services, such as message translation between managed system and managed object, are set at \$100 for workstations and \$200 for servers. The tool kit is priced at \$2,000. Both the services and tool kit will be available in January.

## DEC unwraps agent pack for distributed management

Common Agent for Ultrix eases system mgmt.

By Jim Duffy  
Senior Editor

MAYNARD, Mass. — Digital Equipment Corp. has unveiled management software intended to ease the task of managing Ultrix systems.

The Polycenter Common Agent for Ultrix runs on every Ultrix system in a network. The Simple Network Management

supports SNMP but can be extended to support other management protocols. It is the first in a series of such management agents DEC plans to release. DEC is planning versions of the Common Agent for different operating systems, such as OpenVMS and OSF/1, and for different protocols, such as the Common Management Information Protocol (CMIP).

The Common Agent scheme has particular advantages for systems management, Weisenfeld said, because it obviates the need to write an agent for each Ultrix system in a distributed network. The common services are included in a run-time package and a developers' tool kit is included so users can develop MIBs and directories.

The run-time services are called the Base Kit, which is made up of five components.

The Base Kit's SNMP Protocol Engine handles SNMP management requests and responses be-

**T**he Common Agent supports SNMP but can be extended to support other protocols.

▲▲▲

Protocol agent supports a common set of services for those systems so developers do not have to write an agent for each system.

"The full array of agent services doesn't have to be instrumented in every object or resource that needs to be managed," said Marian Weisenfeld, DEC's Network Application Support system management framework product manager. "We're trying to simplify how you go about making resources in your environment manageable by applications."

The Common Agent also includes programming interfaces so developers can include Management Information Bases (MIB) in the agent software, as well as a directory of other systems on the network. The directory allows the agent to map commands to the appropriate MIBs.

The Common Agent for Ultrix

**T**he scheme obviates the need to write an agent for each Ultrix system in a network.

▲▲▲

tween the managed object and the management console. The Managed Object Modules are the MIBs for the Ultrix systems. They support SNMP MIB II, data on system attributes, and access routines for monitoring and controlling the system.

(continued on page 13)

## IBM APPN patents may foil APPI plans

Cisco will need to include Advanced Peer-to-Peer Networking functions in its planned APPI spec.

By Michael Cooney  
Senior Editor

NEW YORK — Cisco Systems, Inc.'s plan to offer an SNA peer-to-peer networking alternative to IBM's Advanced Peer-to-Peer Networking (APPN) may be foiled by patents IBM has covering APPN.

According to sources close to Cisco who led the formation of the Advanced Peer-to-Peer Inter-networking (APPI) Forum, the APPI specification will need to include some APPN network node functions to be truly effective in handling APPN traffic over wide-area networks.

Specifically, the APPI node will need to have IBM's adaptive pacing features, which control the flow of APPN data across the network, and IBM's addressing scheme, which enables the node to find other resources in the APPN net.

APPN is IBM's dynamic peer-to-peer networking technology

that routes Systems Network Architecture data without host intervention. Network nodes are the brains of APPN, containing routing and directory functions for the APPN net.

"When an IBM end node in an APPN network wants to talk to an APPI-based router, the router is going to need some IBM net node functionality to pass on that data; there's really no way around it," said one source, who asked to remain anonymous. Also, an APPI node can only talk to end nodes or low-entry nodes in an APPN net. It cannot recognize other routers configured as net nodes.

When the APPI specification is released later next year, it will define how SNA/APPN data can be routed across Transmission Control Protocol/Internet Protocol-based WANs without using IBM's Data Link Switching or APPN over TCP/IP specifications, both of which define how IBM wants to (continued on page 13)

## New SNA/LAN software measures net performance

By Michael Cooney  
Senior Editor

AGOURA HILLS, Calif. — Network Telesis, Inc. has introduced software that monitors network performance between LAN- and WAN-connected devices and IBM Systems Network Architecture hosts.

Net-F/X(T-Gen) is on-line data traffic-modeling software that can simulate traffic for a variety of application types, such as file transfers. It lets users model response time and performance between host applications and SNA, IBM Token-Ring, Ethernet or X.25 devices.

The product features three components: a host-based VTAM application; OS/2-based agent software for devices running on the local-area network, SNA or X.25 net; and an OS/2-based master management console.

It works by establishing a session between the workstation

agent and the host application. The host or workstation can send user-defined test data, such as a transaction or file transfer, over the SNA net to the mainframe, where the VTAM application records the response time.

The data is displayed in IBM OS/2 Presentation Manager graphic form on the master management console, which also stores the information for historical reports.

Net-F/X(T-Gen) can emulate as many as 254 workstations when configured as a gateway for Token-Ring or Ethernet LANs. It can emulate as many as 32 logical units per SNA/Synchronous Data Link Control or X.25 port.

For testing, users can adjust message lengths, file-transfer sizes, test intervals and traffic paths between the host and agent. All tests are set up, controlled and scheduled through (continued on page 13)



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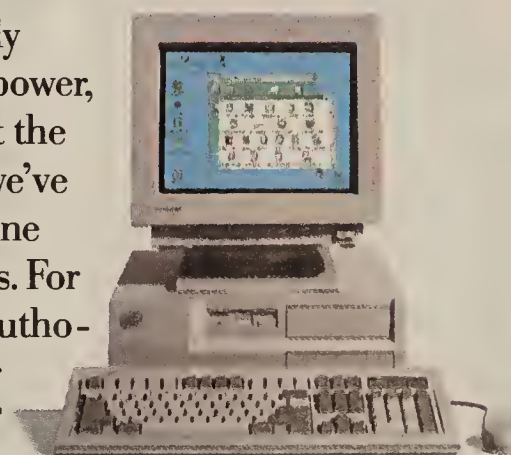
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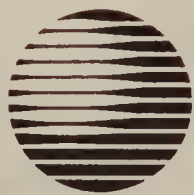
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## DEC unwraps pack for distributed mgmt.

*continued from page 9*

The Managed Object Modules are stored in a Management Information Repository. The repository also houses information on the management commands to which a system responds, as well as responses to those commands.

The Managed Object Location Directory contains a list of the managed systems on the network and the location of the systems' Managed Object Module, or MIB. The directory allows users to update information on the location of systems and their MIBs so it can map commands to the appropriate MIBs.

The Agent Library is a set of routines for translating management commands into messages that the managed system can understand. For example, if a command contains more information than a system can understand, the library will "distill" the

command until the system can interpret it and respond. The library supports SNMP GET, SET and SHOW commands.

The developers' tool kit includes everything in the Base Kit, plus a Managed Object Module Generator for creating C-code management MIBs and extensions to those MIBs. It also includes sample Management Object Modules and debugging routines to assist in MIB development.

DEC, meanwhile, intends to provide a mix of management protocols on different operating systems in the future — for example, CMIP on Unix and SNMP on OpenVMS. This will allow a user that has mostly Unix systems but a smattering of OpenVMS systems to use one protocol to manage the whole environment, Weisenfeld said.

Licenses for the Common Agent for Ultrix Base Kit are \$100 for workstations and \$200 for servers. The developers' tool kit is tagged at \$2,000. Both will be available in January. □

## IBM APPN patents may foil APPI plans

*continued from page 9*

support APPN traffic over TCP/IP.

APPI differs from APPN in that it can dynamically reroute sessions around failed links. Plus, the APPI specification will be available for free from multiple vendors, whereas IBM controls APPN development exclusively.

Cisco, which maintains that APPI can be achieved without licensing the APPN network node specifications, said it will build its own flow control mechanism and addressing schemes. The APPI Forum will develop specifications for routing APPN traffic over TCP/IP nets that avoid APPN net node patents and do not infringe on IBM's patents, said Michael Zadikian, product manager for Cisco's SNA product line.

"APPI does not implement the internals of APPN [network nodes]," Zadikian said. The forum won't put together a specification that infringes on any IBM APPN network node patents, and we won't use any IBM patents unless they can be licensed for a nominal fee, like \$1."

In the past, IBM has maintained that APPN network nodes must be licensed as a whole, for \$400,000. But at the INTEROP 92 Fall conference, IBM said vendors could build their own net nodes with a book of specifications IBM will publish early next year. These specifications include patents that vendors must license from IBM, albeit

for far less than \$400,000.

IBM also maintains that many vendors including Cisco and many of the APPI Forum members already have cross-patent agreements with IBM and that it would be easy to extend those agreements to include APPN network node patents should they choose to build net nodes themselves.

IBM declined to comment on the patent issue. But at the INTEROP show, Ellen Hancock, vice-president and general manager of IBM's Networking Systems group, tried to put the APPN licensing brouhaha in perspective. She said the controversy erupted because IBM selected only a few vendors to do the early development of APPN.

According to Hancock, IBM initially licensed APPN to just a few companies because it needed to work with a manageable number of partners. Now IBM is prepared to expand that and will work with more vendors in the first quarter of 1993.

But Zadikian maintains that there is still an uneven playing field when it comes to working with IBM and APPN.

"The APPI Forum urges IBM to join but will continue its work regardless of IBM's concessions or actions," Zadikian said.

The war of words over APPI and APPN will serve to get APPN more attention than it has managed to garner since its full-blown introduction earlier this year, said Tom Nolle, president of CIMI Corp., a consultancy in Voorhees, N.J. "IBM wants everyone to think APPN," he said, "and this activity is doing just that." □

## Software measures net performance

*continued from page 9*

the master console. Users may schedule tests to take place in the middle of the night, when there is little else running on the net, or during the day and monitor the results in real time.

If performance thresholds are exceeded, an alert is displayed on the master screen. Users can then manually intervene to fix the problem. Alerts can also be forwarded to IBM's host-based NetView network manager for action.

"The product lets users do live modeling of applications and measure effects on

existing net response times before applications are installed," said Roger Mahnke, Network Telesis' vice-president of marketing. "If users are bringing on a new LAN, they can test to see how the LAN traffic will affect overall network performance."

Net-F/X(T-Gen) joins the firm's Net-F/X(A-LAN), a network management tool for interconnected LAN and SNA networks. Net-F/X(A-LAN) can feed data and work with Net-F/X(T-Gen), Mahnke said.

Pricing for Net-F/X(T-Gen) was not announced, but it is expected to be similar to Net-F/X(A-LAN), which sells for \$15,800 and includes the VTAM application and the master console. Each agent costs an additional \$1,250. □



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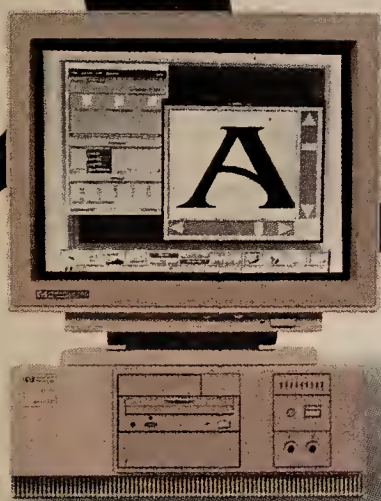
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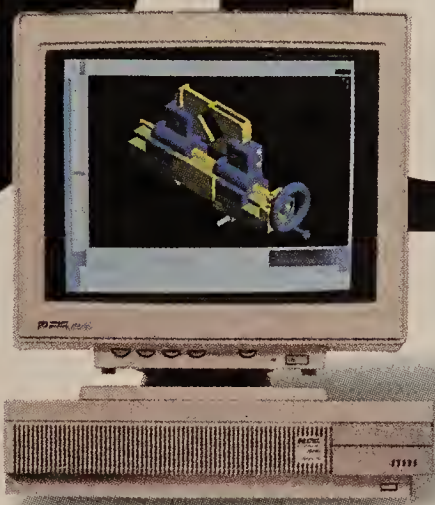
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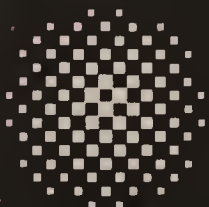
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# LOCAL NETWORKING

LAN HARDWARE, NETWORK OPERATING SYSTEMS AND LAN MANAGEMENT

## Worth Noting

“Novell's remote users are literally terminals to a LAN-based PC. In contrast, Apple and Banyan remote users are true nodes. Their LANs are extended to the remote user via special client software.

Mary Modahl  
Analyst  
Forrester Research, Inc.  
Cambridge, Mass.

## Netnotes

San Diego-based **Octus, Inc.** next week is expected to unveil a DOS version of Fax Conductor, its fax/communications server system. The features of the existing Fax Conductor 750 — including faxing, printing and electronic mail capabilities for Microsoft Corp. Windows-based users on a Novell, Inc. NetWare 2.X or 3.X local-area network — will be provided to DOS-based users on NetWare LANs.

Fax Conductor 750 for DOS will be available by the end of the year. Pricing was not available at press time.

**ABC Systems & Development, Inc.** this week at Comdex/Fall will introduce a net administration tool designed to help administrators more easily manage Microsoft Corp. LAN Manager local-area networks as well as provide tighter security. The new product, called LAN Admin, is a Windows-based software package that sits on top of LAN Manager.

One example of LAN Admin's time-saving functions can be realized when a new user is added to the network. According to ABC, based in Newbury, Mass., all the administrator needs do when adding

(continued on page 21)

## Fax servers come of age, but some problems remain

Lack of standards delays progress of technology.

By Caryn Gillooly  
Senior Editor

As just about every stand-alone office device is being integrated into the company network, so too has faxing become a networking service.

As recently as two years ago, sending a facsimile meant getting up from your desk and going over to the department fax machine, often waiting in a line to use the device or for it to finish sending or receiving.

Today, that picture is different. With the increasing use of fax servers, more and more users can send faxes straight from the personal computers on their desks. And with the ongoing development of fax standards, they can send faxes from within a growing number of applications and receive incoming faxes in electronic form.

“The goal is to make network faxing as easy and integrated as network printing,” said Janet Fugazzotto, senior market analyst, image communications systems at BIS Strategic Decisions, a mar-

ket research firm based in Norwell, Mass.

### The basics

There are a few basic types of fax servers available today. Users can configure their own by loading software and hardware into a workstation, or they can buy a preconfigured system. Although not always necessary, fax servers are usually dedicated to the task. Customers with more limited needs can get their file servers to double as fax servers.

Just as network users can access a central printer, fax servers let users transmit faxes from a central server that supports one or several telephone lines. There, just as in printing, jobs are collected in a queue and are sent in the appropriate order. Some companies' software even lets users prioritize faxes.

There are many advantages and virtually no disadvantages to implementing a fax server, according to analysts.

“It's both time-efficient and

(continued on page 20)

## Vendor unveils network distribution software pack

By Joanne Cummings  
Senior Writer

OSSINING, N.Y. — Destiny Technology Corp. last week unveiled a software distribution product that runs on personal computers and local-area networks and enables net administrators to distribute software, program updates, files or data.

The client/server-based product, called Deliveryman, works with any packaged or home-grown software application and lets either clients or servers initiate distribution.

The server portion runs on a dedicated OS/2 workstation, while the client component runs on DOS-, Microsoft Corp. Windows- or OS/2-based PCs or LAN servers running network operating systems such as Novell, Inc.'s NetWare, Microsoft's LAN Manager or IBM's LAN Server. The client portion can be configured as a terminate-and-stay-resident

(TSR) program or as a regular DOS-like application.

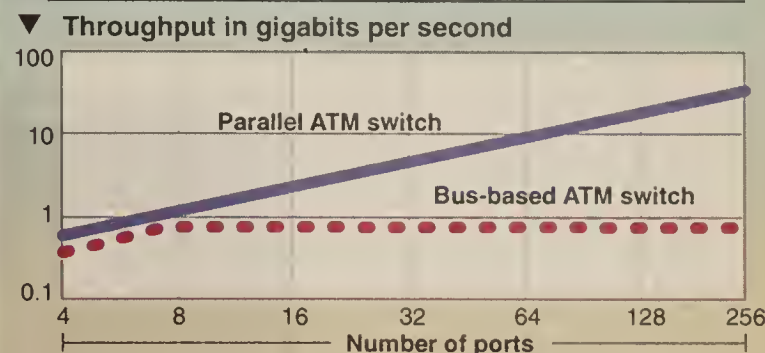
Deliveryman can be used in any Network Basic I/O System or Internetwork Packet Exchange (IPX) network environment and can work across bridges, gateways and routers to distribute software on a wide-area network, according to Scott Broder, president of Destiny, based here.

“We wanted to give users mainframe features without the difficulty of using mainframe-type distribution programs,” Broder said. “Deliveryman runs on a LAN and has an easy-to-use graphical user interface.”

An administrator at the dedicated Deliveryman server creates a “package” that contains the software, file or data to be distributed and parameters such as which workstations or servers should receive it. The package can be created using a fill-in-the-

(continued on page 20)

## Parallel architectures boast scalability



The aggregate bandwidth of Asynchronous Transfer Mode (ATM) switches with parallel architectures can be increased by adding more parallel paths. Shared-bus switches typically have a bandwidth limitation of 1 G bit/sec.

GRAPHIC BY TERRI MITCHELL

SOURCE: SYNOPTICS COMMUNICATIONS, INC., SANTA CLARA, CALIF.

## Approaching ATM switch architectures

The key to scalable performance: bus-based ATM switches or parallel ATM architectures?

By Bert Williams and  
Rob Newman  
Special to Network World

*Williams is a product manager and Newman a product-line group manager for SynOptics Communications, Inc., which has announced plans to develop an Asynchronous Transfer Mode (ATM) switch using a parallel switch architecture. In this piece, Williams and Newman argue the case for parallel architectures vs. bus-based ATM switches.*

ATM is widely hailed as the next generation in networking technology, and for good reason. With its high performance, real-time voice and video support, and private/public network integration, ATM provides the services required by emerging network computing applications.

The upshot is that ATM will play a role in all facets of enterprise networks, including backbone networks and high-performance work group local- and wide-area networks.

ATM's use of dedicated transmission media, fixed-length cells and connection-oriented communications represents a paradigm shift from today's shared-media LAN technologies, such as Ethernet, token ring and Fiber Distributed Data Interface. Rather than the physical-layer repeater-based technologies used in shared-media hubs, the key connectivity technology in ATM networks will be switching.

Because ATM specifies the interfaces for switches but not the

internal design of those switches, vendors have a lot of latitude in choosing an ATM switch architecture and implementation. Two popular types of ATM switch architectures are emerging: bus-based ATM and parallel ATM.

### The two approaches

In bus-based architectures, switch ports connect to a shared backplane bus. When cells enter the switch, they must wait until the bus becomes available before they can be routed to the port to which they are destined.

Current technology limits the economical speed of backplane buses to between 1G and 2G bit/sec. It is unlikely that the cost of higher speed buses will become affordable in the near future because their performance is limited by the laws of physics and mature technologies such as connectors, printed circuit boards and analog components.

In parallel architectures, there is no shared data bus. Rather, the switch ports connect to a switch matrix. When cells enter the switch, they are routed to their destination port by a series of switching elements, which, in their simplest form, contain two inputs and two outputs.

Larger switches can be constructed using an array of these switching elements. Because they run in parallel, there is not the kind of contention that exists in bus-based architectures. Further, because aggregate switch bandwidth is increased by adding more parallel paths rather than

(continued on page 21)



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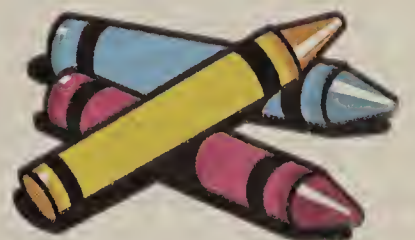
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# DEC bundles software with servers

By Joanne Cummings  
Senior Writer

SHREWSBURY, Mass. — Digital Equipment Corp. has announced plans to bundle a variety of software and hardware with its line of Intel Corp.-based local-area network servers to make them easier to install and use.

The bundling plans actually involve three separate announcements, including deals in which DEC will sell servers packaged with Novell, Inc.'s NetWare 3.11 net operating system or The Santa Cruz Operation, Inc.'s SCO Unix and RealWorld Corp.'s RealWorld accounting and business software.

The first of the bundling announcements, called DECadvantage, covers about 18 pretested DEC and third-party application packages, utilities, tools, networking software and network interfaces for DEC's application-DEC 400xP, DECpc 400ST and applicationDEC 433MP servers.

"With DECadvantage, users are assured that the software, hardware, tools and third-party applications are standardized and compatible," said Dan Kusnetzky, manager of software marketing at DEC's Data Server Business Unit here. "It lets them forget about compatibility issues and concentrate on applications."

DECadvantage, designed for Transmission Control Protocol/Internet Protocol or Open Systems Interconnection environments, consists of three systems management tools, LAN and wide-area network interfaces, client/software application development tools and third-party application packages, such as JSB's Multiview Mascot, which gives character-based terminals windowing capabilities. Users choose the tools they need, and DEC configures the server to support them, Kusnetzky said.

A typical IBM host to Windows client configuration, including all necessary client and server software as well as a server configured for 16 users, would cost approximately \$25,330, or a little over \$1,500 per user. DECadvantage is available now.

Separately, Kusnetzky said DEC is also now offering the servers preconfigured with Novell, Inc.'s NetWare 3.11 or with SCO Unix and RealWorld Corp.'s RealWorld accounting and business software.

The Novell-configured server is priced from \$8,999 to \$10,699, depending on number of users and type of processor supported by the server. The price includes a free upgrade to NetWare 4.0 when it becomes available.

A typically configured RealWorld server package, consisting of RealWorld and SCO Unix and supporting eight users, costs \$16,768. Both are currently available.

DEC also announced PathWorks for SCO Unix V1.0 software. Based on Microsoft Corp.'s LAN Manager for Unix 2.2, this client/server software package enables DOS, Windows or OS/2 clients to access file and print services, as well as applications and network peripherals, of a server running SCO Unix. The software supports Network Basic I/O Sys-

**"With DECadvantage, the software, hardware, tools and third-party applications are fully compatible."**

tem Extended User Interface, DECnet and TCP/IP.

PathWorks for SCO Unix will be available in December and is priced at \$295 for the server portion and \$205 for the client software. ■

## Fax servers come of age

*continued from page 17*

cost-effective," Fugazzotto said.

The time-efficiency factor is obvious — with a fax server in place, users no longer have to leave their desks and wait to send faxes. The cost-efficiencies kick in for larger organizations.

**F**ax servers "provide greater security because no one at the transmitting site sees the document being sent."

▲▲▲

Today, Fugazzotto said, many users have fax modems — combination modem/fax boards — in their desktop machines. However, each fax modem requires a separate fax line.

"The fax modem market doubled between '91 and '92, going from 1.2 million to 2.4 million units sold," Fugazzotto said.

However, as more users need faxing capabilities, companies are looking for more efficient ways to provide them from the desktop.

"If you have an office with 50 employees, one fax server with four fax lines is going to be much more cost-effective than 50 separate fax lines," she said.

Another advantage to a fax server is security, according to a study by Computer Intelligence, a market research firm based in La Jolla, Calif.

"[Fax servers] provide greater security because no one at the transmitting site sees the document being sent except the person writing it," the study said. The same will be true for incoming faxes as in-bound fax routing is more widely used.

The study goes on to point out other advantages of fax servers, such as the ability for network ad-

ministrators to maintain records on fax usage and the ability to buffer faxes and delay their transmission until the phone rates drop to save on line costs.

### Not all there, yet

Being a relatively new phenomenon, however, fax servers are just beginning to provide capabilities that, to those unfamiliar with the market, might seem fairly basic. For example, most fax server implementations still print incoming faxes instead of distributing them electronically.

According to Fugazzotto, the most widely used electronic fax distribution method today is achieved by teaming up direct-inward dialing (DID) telephone service with fax servers. This gives each user their own fax number without incurring the cost of separate lines. When faxes come in, the customer's private branch exchange passes on the DID information to the server, which routes the fax accordingly.

Although this is today's most reliable method, DID trunks aren't free.

The other two methods use regular phone links and determine how to route the call by using optical character recognition (OCR) or dual-tone multifrequency (DTMF).

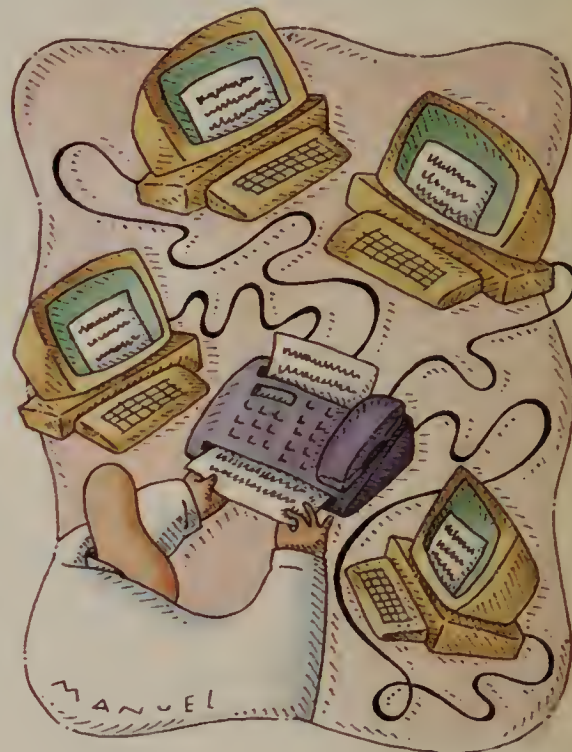
OCR relies on fax server software to recognize a routing number identified by some notable characters, such as double parentheses, and then sends the fax to the appropriate user. DMTF requires the sender to use their push-button phone to punch in a code identifying the recipient.

According to Fugazzotto, neither of the latter methods are very reliable. The first basically relies on the sender to have good handwriting or to remember to put in the user's code. The second

means the sender cannot be using a fax server, as the person must be present to punch in the appropriate codes.

The Consultative Committee on International Telephony and Telegraphy is working on its own in-bound routing method called fax subaddressing, which could solve the problem by providing room for a subaddress field in the fax number that defines exactly which network user is the fax recipient.

Standards are also needed to



address the need to enable users to send a fax from within an application, a task that is currently possible when printing or sending electronic mail.

According to Fugazzotto, there are currently two popular application program interfaces (API) being used for in-application faxing: FaxBIOS, developed by WordPerfect Corp. and Everex Systems, Inc., and CAS, developed by Intel Corp. The CCITT is also developing a standard API called Appli/COM, although it is not certain when this might become a standard.

Despite the lack of standards, however, analysts agree fax servers are set to take off.

According to the Computer Intelligence study, "1993 should be a banner year for [fax servers], and the market will continue to grow through 1995." ■

## Vendor unveils net software

*continued from page 17*

blanks template or by using Deliveryman's scripting language. It is then compressed and sent to the predetermined clients.

If the Deliveryman client is running as a TSR, the software is loaded upon delivery and the process is server-initiated. But if the client software is configured as a regular application, users load what has been distributed when

they want, in a client-initiated mode, Broder said.

In addition, network administrators can set up Deliveryman to distribute software immediately or delay the action, for example, after regular business hours.

Besides its distribution functions, Deliveryman also creates an inventory of net-attached devices, including PC type, hard disk size and storage space available, and uses this information to custom-configure the distributed software for each client, accord-

ing to Broder. If Deliveryman is unable to make a delivery due to space constraints or other reasons, it informs the administrator via error messages.

Also, the software generates management reports on PC software configuration and inventory, enabling users to better track software usage.

Deliveryman is currently available and ranges in price from \$1,000 for a 10-user package to \$9,500 for a 250-user package.

This pricing is much higher than a similar product recently announced by Frye Computer Systems, Inc. called Software Update and Distribution System (SUDS). SUDS can distribute software across NETBIOS and IPX LANs and WANs, but it retails for just \$495 for a 50-user license.

SUDS has only limited OS/2 software support, however, and is not designed for heavy-duty use. "Deliveryman is designed to be used in environments that are rapidly growing and whose soft-

ware needs are always changing," Broder said. "It's like a transaction processing environment for software distribution."

Frye said its SUDS product can perform virtually the same functions as Deliveryman but costs less because many of its capabilities were already available in other products. For example, SUDS uses the same hardware and software statistics collection as Frye's previous LAN Directory software, so it did not have to develop them for SUDS. ■



## ATM switch architectures

*continued from page 17*

trying to make a single path faster, high-capacity switches can be constructed very economically.

For switches with a few ports, bus-based switches and parallel switches offer sufficient aggregate bandwidth to provide full throughput to each switch port.

For example, an ATM switch with eight 155M bit/sec ports must supply 1.24G bit/sec of aggregate bandwidth to supply full throughput to every port. This level of throughput is available from both bus-based and parallel switch architectures, but it is at or near the upper limit of what a bus-based switch can support.

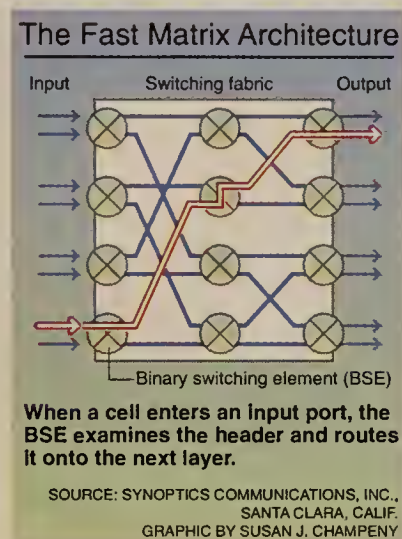
As the number of switch ports increases, the technological constraints of bus-based switches will not allow the switch's total throughput to scale accordingly.

The 1.24G bit/sec that was sufficient to support full throughput in an eight-port switch can support only half that amount in a 16-port switch, a quarter of the throughput in a 32-port switch and so on.

When bus speed becomes a bottleneck, users find themselves in the same situation they have with shared media LANs: As more users are added, the average available bandwidth per user decreases (see graphic, page L1).

Short of redesigning the basic architecture of their switches, vendors that have adopted a bus-based switch architecture will either be unable to offer full throughput on their high-port-count switches or call for custom-

requires a faster bus or a wider bus, both of which are expensive. The scalability of parallel switches means that every network attachment gets a dedicated transmission channel whose bandwidth is not limited by the throughput of the switch, no mat-



ter how many other attachments are connected to the switch.

### Fast Matrix Architecture

One example of a parallel ATM switch architecture is the Fast Matrix Architecture, based on concepts developed by Dr. Jonathan Turner, a professor of computer science at Washington University in St. Louis, commercialized by SynOptics and being adopted by other vendors.

At the heart of the Fast Matrix Architecture is the binary switching element (BSE), which has two inputs and two outputs. BSEs can be combined into arrays that function as parallel switches with large numbers of inputs and outputs providing a dedicated data pipe of, for example, 155M bit/sec to a theoretically unlimited number of network users.

Because of design choices made in their construction, ATM switches using the Fast Matrix Architecture may make up a totally parallel, virtually nonblocking switching fabric with multicast and broadcast capabilities.

The Fast Matrix Architecture supports multiple parallel paths through the switching fabric, which allows multiple traffic streams through the switch simultaneously. This means that two data streams addressed to the same destination can find different paths through the switch at the same time, never collide and reach their destination at the average 155M bit/sec data rate.

The Fast Matrix Architecture achieves its parallelism, non-blocking nature and multicast capabilities via four mechanisms that augment its basic character of an array of fast switches:

- Randomized traffic distribution.
- Distributed internal buffering.
- An internal clock that runs faster than the incoming links.
- Cell copying capabilities.

The role these mechanisms play is made clear by examining the transmission of a cell from one user to another via an eight-port input/eight-port output switch (see graphic, this page).

Each BSE in the switch is responsible for correctly routing the cell to the next BSE. When a cell enters an input port, the first BSE examines the header and decides which of its two outputs should receive the cell.

The BSEs in the second and third stages of the switch do the same thing, ensuring that the cell is routed to the proper output. While one ATM data cell is going through the switch to one port, other cells can enter the switch on other input ports and be routed to other output ports without having to contend for the transmission medium or switching fabric. The internal pathway is clear.

Blocking can occur in parallel ATM switches, when both inputs to a BSE need to send cells to the same output at the same time.

The Fast Matrix Architecture deals with this by minimizing the probability of this occurring by randomizing traffic distribution across the multiple paths between inputs and outputs.

However, when two cells are heading for the same BSE output simultaneously, the Fast Matrix Architecture uses two mechanisms that maintain the switch's ability to transmit data at the link's full 155M bit/sec speed.

The first is a small amount of internal buffering, which allows one cell to wait while the other cell is routed through the switch. This solution alone, however, would not maintain ATM's high data rate. To do that, the architecture pairs the buffer strategy with an acceleration of the data rate within the ATM switch fabric beyond the speed of incoming data.

Multicasting and broadcasting are done by giving BSEs the ability to copy cells. The header of each cell contains copying instructions for that cell. Each BSE examines the instructions to determine if it should make a copy of the cell or forward it uncopied.

The copying function occurs as late as possible in the switch fabric when there is less traffic using pathways in the switch.

This minimizes the chances that multicasting will cause blocking in the switch. If blocking occurs, the internal fabric speed-up and distributed buffering described earlier will ensure that it does not affect end-to-end switch performance.

ATM gives users the high performance they need for campus backbone and high-speed workstation and server connections. A key to ATM's performance is dedicated bandwidth rather than the shared communications medium of conventional LANs. □

## HP FDDI network analyzer generates, measures traffic

By Ellen Messmer  
Senior Correspondent

PALO ALTO, Calif. — Hewlett-Packard Co. has announced the HP 4983A Network Advisor for troubleshooting Fiber Distributed Data Interface networks.

The FDDI analyzer, which will ship the first quarter of next year, can generate traffic while measuring the effect, allowing network managers to simulate network loading for analysis of performance and reliability.

The transportable, 25-lb. device comes on either an Intel Corp. 80386 or 80486 platform. Both machines have 16M-byte buffers for capturing data. The 386 has 8M bytes of main memory, while the 486 has 16M bytes. An optional buffer for both machines expands storage to 32M bytes.

Customers that already have Network Advisors for Ethernet and token-ring networks can add the FDDI support by purchasing the FDDI network interface module.

The FDDI analyzer's Reduced Instruction Set Computing (RISC)-based front end captures the data packets and provides

real-time network statistics in the areas of utilization, errors, claim frames, beacons, frame type, selected stations, destination address and protocols.

Users can select and display any four statistical measurements simultaneously. The analyzer can store data and replay it, or export it to a spreadsheet for further review.

The Network Advisor identifies protocol frames and isolates protocol errors by highlighting them on the screen. Link-level protocols supported include FDDI media access and Station Management (SMT), as well as networking protocols such as the Transmission Control Protocol/Internet Protocol, Digital Equipment Corp.'s DECnet, Apple Computer, Inc.'s AppleTalk, IBM's Systems Network Architecture, Network Basic I/O System, Open Systems Interconnection and Xerox Corp.'s Xerox Network Systems.

Versions of the FDDI analyzer, depending on system memory and buffer options, range in price from \$20,000 to \$33,000. The device is available for both single- and dual-attached FDDI rings. □

## Netnotes

*continued from page 17*

a new user to the network is select the server to be used and the group to which the user belongs. When adding a new user to the net, LAN Admin automatically takes care of creating the user directory, setting access rights and configuring the correct Windows icons for the individual user.

Also, LAN Admin lets administrators restrict a user's logon time periods and control an application on a user's workstation.

LAN Admin, available now, costs \$720 for a 10-workstation server pack.

**Digital Communications Associates, Inc.** recently introduced new versions of its Irma WorkStation for Macintosh (IWM) and Irmalan Client for Macintosh (ICM) software to support Apple Computer, Inc.'s A/UX version of Unix and Novell, Inc.'s NetWare for SAA.

IWM and ICM are DCA's Macintosh-to-mainframe connectivity packages. IWM lets individual users view, manipulate and transfer mainframe information from the Macintosh desktop. ICM gives network users the same capabilities as IWM and relies on DCA's Irmalan/EP 3270 gateway for the Macintosh-to-mainframe

translations.

With A/UX support, Macintosh users can now operate IWM and ICM from their Macintosh graphical user interfaces and access mainframe applications. NetWare for SAA support lets users employ the Novell product as the mainframe gateway.

IWM 3.0 and ICM 3.0 are available now for \$425 and \$3,995, respectively. Current users of the previous IWM version can upgrade to Version 3.0 for \$95 or upgrade to ICM for \$395. DCA is based in Alpharetta, Ga.

**Triticom** has enhanced its LANdecoder/tr LAN protocol analyzer to support more than 50 adapters and to include enhanced decode capabilities for a wider range of protocols.

LANdecoder/tr Version 1.1 can now provide protocol decodes for the Transmission Control Protocol/Internet Protocol, Network Basic I/O System, Novell, Inc. NetWare Lite and NetWare 3.X protocols. In addition, a new seven-layer protocol decode summary lets users see the top-most user-selected protocol layer as decoded by the product, according to Triticom, based in Eden Prairie, Minn.

LANdecoder/tr 1.1 is available now for \$1,195, the same price as the previous version. □

**M**ulticasting and broadcasting are done by giving BSEs the ability to copy cells.



ers to install more small switches.

Growing nets by interconnecting a large number of smaller switches, however, makes for inefficient use of ports because a high percentage of the ports would be needed for switch-to-switch — as opposed to switch-to-end node — connections.

With a parallel architecture, these constraints do not apply. Higher capacity switches can be constructed inexpensively by constructing larger arrays of simple switching elements. Nothing about the switching element itself has to change.

By contrast, with bus-based switches, higher total throughput



# COMPUTERWORLD



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# INTERNETWORKS

LAN-TO-LAN AND LAN-TO-WAN EQUIPMENT AND STRATEGIES

## Worth Noting

“Our new business unit that helps users bring disparate work groups together in an enterprise net is a lot like Burger King: You can have it your way.”

**Dan Wick**  
General manager  
Network Integration  
Services division  
Ungermann-Bass, Inc.  
Santa Clara, Calif.

## Link Notes

**LANNET Data Communications, Inc.** has rolled out a four-port Fiber Distributed Data Interface concentrator module for its MultiNet smart hub line. With the addition of the module, the company's hub now supports all three local-area network technologies — Fiber Distributed Data Interface, Ethernet and token ring.

The new LFD-104 module, which takes up one slot in the MultiNet and supports dual-attached devices, allows the user to create an FDDI ring, complementing the four Ethernets and 18 token rings the high-end LET-36 MultiNet hub currently supports.

The LFD-104 will be available by the end of the year and is priced between \$4,495 and \$7,995. For more information, call (714) 891-5580.

**Advanced Computer Communications (ACC)** announced that it will be adding the bandwidth optimization features found on its Nile bridge/router to its Series 4000 line of bridge/routers (“ACC bridge/router boasts bandwidth optimization,” *NW*, Sept. 28) via a new software release.

Bandwidth Optimization  
(continued on page 28)

## SynOptics bolsters FDDI line with new product suite

Offerings boast SDDI, single-mode fiber support.

By Skip MacAskill  
Staff Writer

SANTA CLARA, Calif. — SynOptics Communications, Inc. last week rounded out its FDDI product line with a suite of new offerings that support single-mode fiber and shielded twisted-pair connections.

As part of the rollout, SynOptics announced support for the emerging standard — dubbed SDDI — for 100M bit/sec Fiber Distributed Data Interface networks over shielded twisted-pair cable at distances up to 100 meters.

The company unveiled SDDI support in the new Model 2912A-04 SDDI Workgroup Concentrator, which is a 12-port, stand-alone FDDI hub designed for work group and department local-area networks that supports single-attached devices.

Available now, the hub costs \$15,500.

SynOptics also added Model 3902A SDDI Host Module to its FDDI product line. The four-port module resides in the company's LattisNet System 3000 or 2000

modular intelligent hubs and supports single-attached devices.

The SDDI Host Module is also available now and is priced at \$4,995.

Additionally, SynOptics introduced single-mode fiber versions of its management and host modules for the System 3000 hub. The Model 3910SA-SM-04 FDDI SMF Network Management Module, which can manage any FDDI module in the System 3000, will be available in the first quarter of next year. It will cost \$24,995.

The Model 3904-2SM FDDI SMF Host Module supports two multimode fiber ports for connections up to two kilometers and two single-mode fiber ports for links up to 10 kilometers. It will also be available first-quarter 1993 for \$17,495.

In conjunction with the release of the new products, SynOptics also unveiled a new FDDI Agent Release. The management software allows the products supporting SDDI or single-mode fiber to be managed by Optivity, the company's network management system. □

## Vendor rolls out bridge, hub modules; cuts prices

By Maureen Molloy  
Senior Writer

DALLAS — NetWorth, Inc. has announced a local bridge for its Series 4000 hub, as well as a new module and an ISA bus-based expansion card that let a file server act as a hub.

The Series 4000 Local Ethernet Bridge Module is a two-port device that provides bridging between any of the hub's five Ethernet backplanes. Based on an Intel Corp. 80486 processor, it includes two Ethernet interfaces: an RJ-45/attachment unit interface connector on the front of the bridge module and another accessed via one of the hub's backplanes. This enables users to bridge traffic between internal and external Ethernet segments.

In addition, the backplane connector is software-selectable so users can switch the bridging among any one of the five Ether-

net segments on the hub's backplanes to an external Ethernet local-area network or one housed inside another hub.

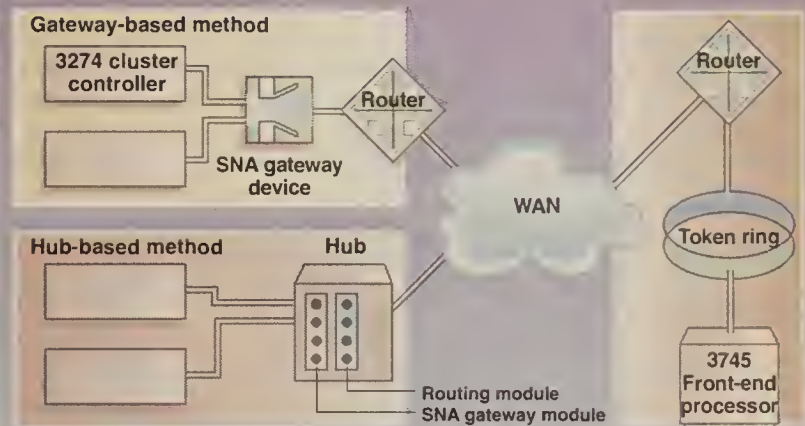
The bridge, which supports the Spanning Tree Algorithm, costs \$3,495 and will be available in January.

NetWorth's new 12-port 10Base-T HubCard fits into a file server and is aimed at small Novell, Inc. NetWare LANs and remote work groups where the server is located with the workstations.

A server equipped with a HubCard and multiple expansion slots can be outfitted with up to nine 12-port Industry Standard Architecture (ISA) expansion cards that are daisy-chained from each HubCard, enabling up to 120 users to be linked to a single server.

The 12 10Base-T connections  
(continued on page 28)

## To integrate or not to integrate



Hub vendors are integrating more SNA technology into their devices, allowing users to centralize and consolidate network devices and more easily extend umbrella management services.

GRAPHIC BY SUSAN J. CHAMPENY

## Hubs offer platform for SNA/LAN union

To bridge LAN, SNA worlds, hub makers forming partnerships with SNA internetworking vendors.

By Skip MacAskill  
Staff Writer

Although the hub market has been awash with news about vendor's long-term Asynchronous Transfer Mode plans, more immediate concerns involve the integration of IBM's Systems Network Architecture world into LAN environments.

To address the issue and position their devices as the platform of choice for network integration, many hub vendors are teaming with leading SNA internetworking vendors.

Cabletron Systems, Inc. has announced, for example, that it will integrate Sync Research, Inc.'s SNA Network Access Controller, which converts Synchronous Data Link Control traffic into 802.2 Logical Link Control 2 (LLC2) data, into its intelligent hub line (“Cabletron sees a Bluer internetwork,” *NW*, Oct. 12).

According to analysts, the hub is an ideal platform in which to meld the SNA and local-area network worlds. While many networks are still router-based, in the last 18 months, the hub has started to become the central consolidation device so it makes sense to start integrating functions such as SDLC conversion, said Michael Howard, president of Infonetics Research, Inc., a consultancy in San Jose, Calif.

Placing this type of conversion functionality into the hub allows users to avoid the cost of adding stand-alone gateways to front end bridge/routers, en-

ables equipment to be centrally located and eases network management (see graphic, this page).

The first step in the SNA/LAN integration is the conversion of SDLC traffic into LLC2, which is a protocol developed by the Institute of Electrical and Electronics Engineers, Inc. for data link-level transmission control over token-ring LANs.

There are two major camps on how this traffic conversion should be done. Some hub makers, such as Ungermann-Bass, Inc., openly support IBM's Data Link Switching (DLS) technology, while others, including Optical Data Systems, Inc. (ODS) and SynOptics Communications, Inc., are turning to Sync Research for the basic conversion technology.

“We are speaking to just about anyone you can think of,” said Lynn Nye, director of product marketing at Sync Research. “The fact that hub vendors need to do something in this area is pretty obvious. They have to decide whether to couple the technology as tightly with the hub as Cabletron did or front end the device like many of the bridge/router vendors are doing.”

ODS, like Cabletron, will be integrating the SDLC conversion into its intelligent hub line. Although no deal has been finalized, the Richardson, Texas-based company is close to partnering with Sync Research for the technology.

SynOptics is also exploring  
(continued on page 24)



## Hubs offer platform for SNA/LAN union

*continued from page 23*

the issue of doing the SDLC conversion within the hub via gateway technology from Sync Research or Netlink, Inc., according to Dan Simula, senior product-line marketing manager at the Santa Clara, Calif., company.

"We will be partnering with other vendors to get this technology, but whether it's integrated into the hub will depend on how it fleshes out from a price/perfor-

mance standpoint," he said.

SynOptics, which will have a clearly defined SNA direction by next year, also pointed out that the overall issue of integrating the SNA and LAN environments is a complex one.

According to Michael Szabados, director of systems marketing for SynOptics, there is a move afoot by the internetworking vendors to devise solutions to SNA/LAN integration, instead of waiting for IBM to provide the answers. "By mid-1994, that market, which is dominated by IBM now, might show almost an even split be-

tween IBM and the hub makers," he said.

One group of vendors, however, will not be competing with IBM but working with Big Blue to incorporate its DLS technology into the hub.

DLS is IBM's method of integrating SNA and Network Basic I/O System traffic with other protocols on an internetwork. DLS ensures that critical SNA timing and reliability are maintained across the wide area, thereby protecting the integrity of end-user applications.

Many industry observers view Chipcom Corp. as a future leader in this area based

on its recent alliance with IBM.

The companies announced in July that they would be teaming to develop unspecified internetworking products, but details were not forthcoming at the time ("IBM partners with Chipcom to enhance LAN hub line," *NW*, July 27).

And it appears that they still are not. While admitting that its relationship with IBM puts them in a unique position in the SNA-to-LAN market, Chipcom declined to discuss any possible projects that were ongoing.

"We're evaluating the whole area, and it appears to be a natural for the hub makers," said David Howley, token-ring product-line manager for Chipcom, based in Southborough, Mass. "I can't comment on what we might be doing, but the hub seems to be the most logical place for much of this integration to take place."

UB, however, was more forthcoming with its SDLC conversion strategy, which involves DLS.

According to Michelle McGregor, marketing manager for UB, the company will be supporting SDLC conversion of some type in the near future, and the interim platform for the capability will be Access/Open, UB's three-slot adjunct processor that attaches to its Access/One intelligent hub.

In the long term, UB is planning to implement the technology directly in Access/Open. Although most details have not been set, the decision on which technology to use has already been determined.

"No decision has been made on how to do it, but we are very supportive of IBM's DLS approach that is used in its 6611 router," McGregor said.

DLS is seen as a more efficient way of moving SNA traffic across an internet because it incorporates support for SNA transmission by stripping off the SDLC header and replacing it with a Transmission Control Protocol/Internet Protocol one. This is an alternative to transmitting SNA traffic across an internet via encapsulation in TCP/IP, which is the method currently employed by most router vendors.

In order to address the inefficiencies of routing SNA data via TCP/IP encapsulation, a number of the bridge/router makers have signed OEM or reseller deals with SNA internetworking vendors, such as Sync Research and Netlink, in order to front end the bridge/routers with SNA gateways.

Proton, Inc. and Wellfleet Communications, Inc., for example, recently announced they would resell Netlink's SDLC Link Servers, while 3Com Corp. and Ascom Timeplex, Inc. are expected to announce similar deals with Sync Research ("Netlink and Sync Research enhance their SNA gateways," *NW*, Oct. 26).

Cisco Systems, Inc. will be developing its own SDLC technology, but Dick Boyle, program director at Gartner Group, Inc., a market research firm in Stamford, Conn., contends that the SDLC conversion is better left to the SNA gateway vendors.

"We're not necessarily believers that converting SDLC to LLC2 should be done in routers," he said. "That should be left to the vendors like Sync Research and Netlink, and the routers should handle token-ring LAN traffic. A router is designed to be a router, not an SDLC handler." **■**

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The ALM 3226 connecting a laptop to a cellular phone. (Approximate size is 1" X 2 1/2" X 5 1/4")

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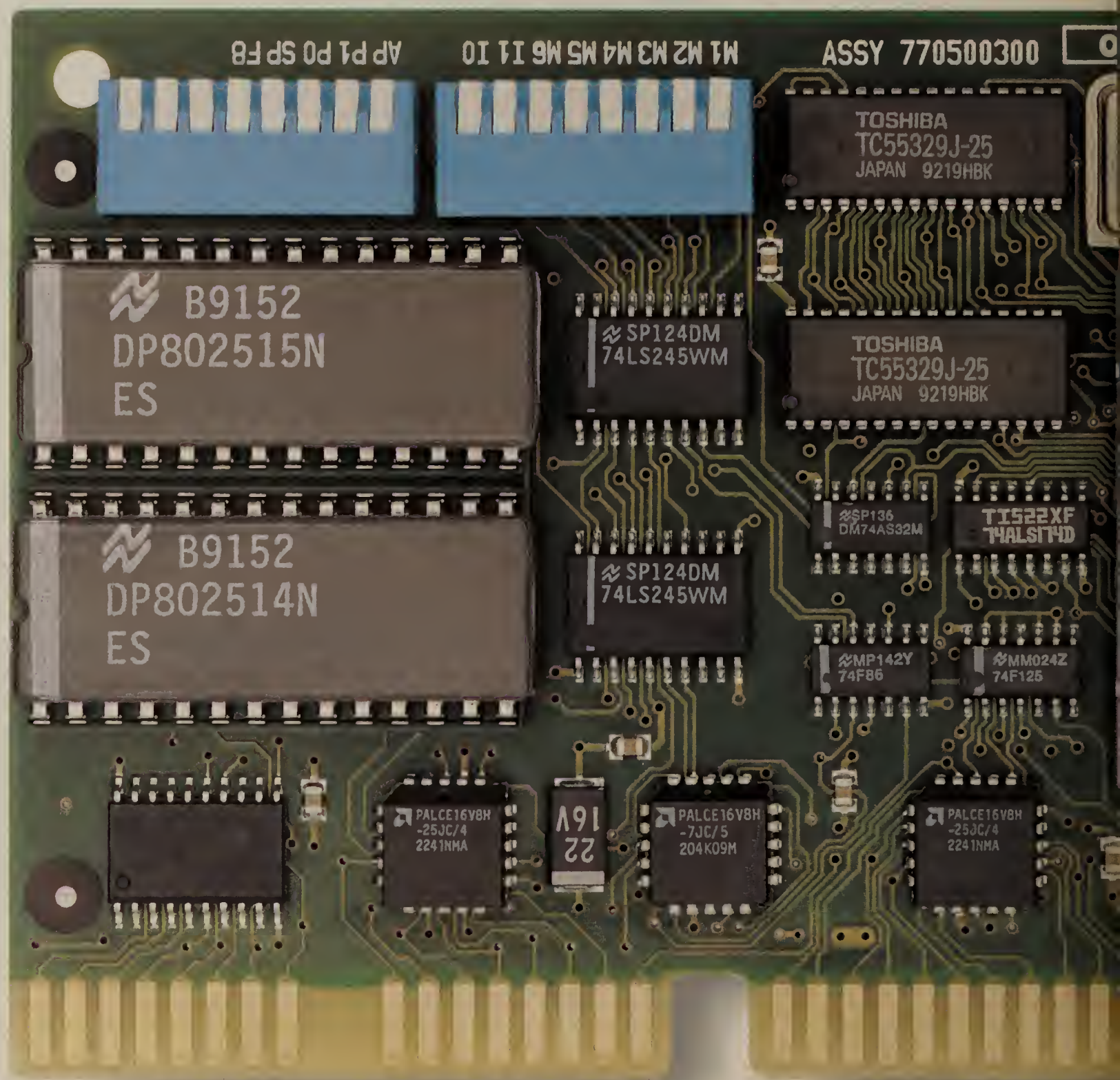
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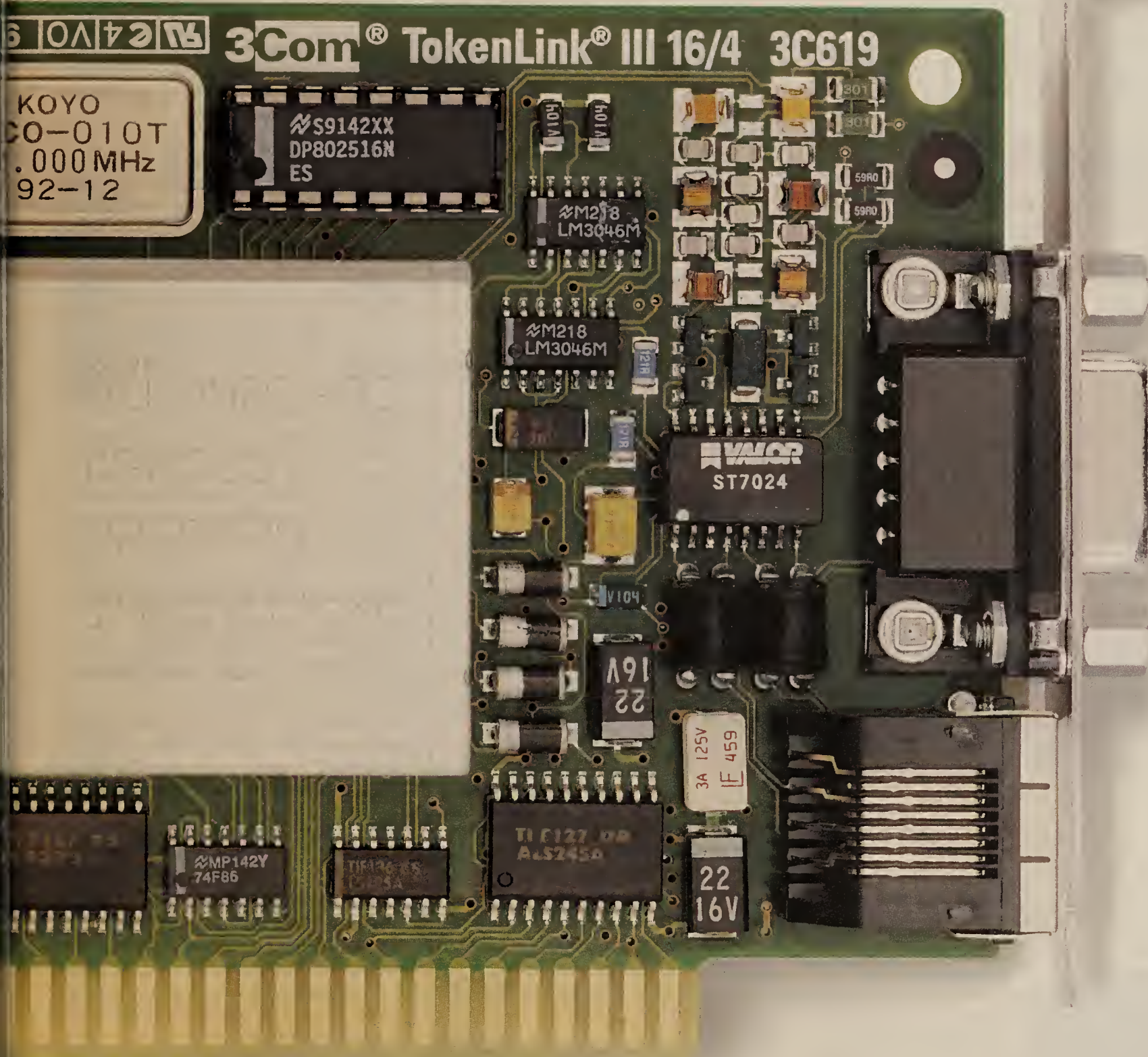
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## Link Notes

continued from page 23

Release 6.0 is an integrated set of software features — including data compression, frame compression, express queuing, dial-on congestion and dial backup — designed to optimize the utilization of wide-area links and reduce operating costs by obviating the need for additional trunk lines.

The software upgrade will be offered to existing customers for \$1,000. For new users, the package will be included in the price of the bridge/router. It is available

now. Call ACC at (408) 864-0600 for more details.

**Bytex Corp.** last week was awarded a contract to supply Citizens Insurance Co. of America with Series 7700 Intelligent Switching Hubs to centralize management of Citizens' large token-ring internet.

In the initial phase, six Series 7700 hubs will be installed in a collapsed backbone in Citizens' new facility. A seventh hub will be installed in the corporate headquarters building a mile away that will provide a link to the company's IBM Systems

Network Architecture backbone. Other hubs will be added as the company expands its facilities with new buildings to be constructed before 1996.

**RAD Network Devices, Inc.** last week announced a new release of its Local Token Ring Bridge (LTB) that offers a packet forwarding rate of 3,400 packet/sec for 64-byte packets. In addition, it can forward large packet sizes at 15M bit/sec — nearly token ring's maximum wire speed of 16M bit/sec.

The vendor said it was able to boost the

speed of the latest LTB version by adding Texas Instruments, Inc.'s Turbo Mac software.

In addition, the new version is equipped with an internal single or multimode fiber-optic interface, enabling the LTB to be linked to fiber-optic backbones.

For more information, contact RAD at (714) 891-1446.

**Synernetics, Inc.** recently lowered prices on the work group versions of its LANplex 5000 Ethernet switching hub by as much as \$6,000 — 18% overall. In the largest drop, the LANplex 5004, which supports eight Ethernet ports and a Fiber Distributed Data Interface network interface, is now priced at \$25,800, down from \$31,800. The same model without FDDI is priced at \$16,800.

For more information, contact Synernetics at (800) 992-2446.

**Clearpoint Research Corp.** announced support for Apple Computer, Inc.'s AppleTalk protocol in its Constellation Series line of bridge/routers. Added via a programmable read-only memory upgrade that users can install themselves, the software allows Apple computers, servers and printers to communicate over a Constellation internet. AppleTalk is the latest routing protocol supported by the Constellation Series. Protocols currently supported include Transmission Control Protocol/Internet Protocol, Novell, Inc.'s Internetwork Packet Exchange (IPX) and Xerox Corp.'s Xerox Network Systems.

The AppleTalk software will be available later this year at no cost. For more information, contact Clearpoint at (800) 253-2778. □

## Vendor rolls out bridge, hub modules

continued from page 23

are made via a 50-pin telephone company connector. The vendor is also offering an optional \$75 adapter to convert the 50-pin connector to RJ-45 connectors. An optional Physical Media Expansion Card, costing \$99, provides thick- and thin-net connectivity to existing Ethernet LANs.

The HubCard and Expansion Card are both compliant with Novell's Hub Management Interface standard and can be managed via a NetWare Management System or HubCon, Novell's hub management utility.

The ISA HubCard costs \$745, while the ISA Expansion Card is priced at \$645. Both are available now.

Finally, NetWorth announced it is lowering the cost of its MicroHubs, one model of the Series 4000 hub chassis and its line of network interface cards.

The cost of its nine-port 10Base-T EtherNext MicroHub is being reduced by 19%, to \$525. The MicroHub-B, which is equipped with eight unshielded twisted-pair ports, is being reduced by 15%, to \$575.

Pricing for the 10-slot Series 4000 Enterprise Command Center hub chassis has been cut by 12%, to \$2,995. EtherNext eight-bit and 16-bit 10Base-T adapter cards have been reduced in price to \$179 and \$199, respectively.

All price cuts are effective immediately. □

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Does it eliminate work? Other hubs

make you run to the wiring closet and patch in reconfigurations by hand. Fact: The 7700 hubs do that work for you. And we can demonstrate it. Ask other vendors what they can demonstrate.

Does it improve network availability? Some hubs have redundant components.

But that isn't enough. Fact: Bytex hubs help you build a fault-tolerant network. They can switch to backup components automatically and transparently for continuous network operation.

Will it save you money? Hub vendors like to talk about low cost. Fact: With its switching technology, the 7700 reduces downtime, offloads staff and improves network uptime. On a large network, that

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## Worth Noting

“Virtual global LANs are not far away, so telecom managers [should] expect to become LAN managers.”

**Barry Volante**  
Program manager  
Telecommunications planning  
General Electric Co.  
Stamford, Conn.

## Regulatory Update

**Sprint Corp.** last week asked New Jersey regulators for permission to provide local switched voice, 800 and dedicated services. Long-distance carriers are currently permitted to carry intrastate traffic across boundaries of local access and transport areas in New Jersey. Sprint is asking regulators to go a step further and give it full authority to compete with New Jersey Bell Telephone Co. for intra-LATA traffic.

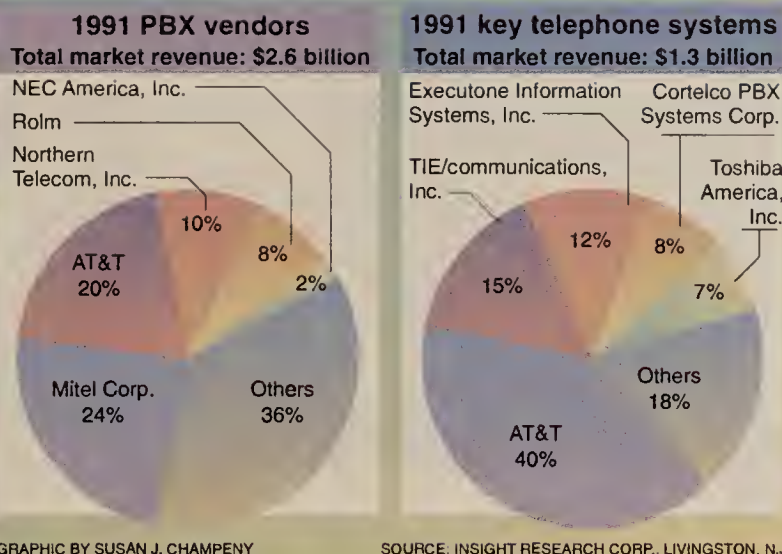
It is technically feasible to complete a local call over a long-distance carrier's network by dialing the carrier's access code and then the local number. But because long-haul companies are not authorized to carry that traffic, they have to pay the local carrier when customers place calls this way. Long-distance carriers in New Jersey must pay 8.22 cents per minute for such traffic.

In its petition filed last week, Sprint asked that it be allowed to carry such intra-LATA traffic without having to compensate the local carrier. It said that 43 states now allow some form of intra-LATA competition.

Although local carriers claim that intra-LATA competition could threaten universal service to local customers, Sprint refuted that concern in

(continued on page 54)

## Low-end switch market leaders for systems under 100 lines



## Realtor blames carriers for misuse of its 800 number

Tells FCC that AT&T interfered, MCI ignored pleas.

**By Anita Taff**  
Washington Bureau Chief

WASHINGTON, D.C. — An 800 user who says his computerized real estate business was ruined by AT&T and MCI Communications Corp. last week filed a formal complaint at the FCC seeking \$1.35 million in damages from the carriers.

In the complaint, Michael Valenti, former mayor of Point Pleasant, N.J., said he was driven out of business because AT&T flooded his 800 number with test calls that tied up the toll-free lines and prevented customers from getting their calls through.

Valenti places equal blame on MCI, which actually supplied his 800 service, claiming the carrier failed to respond to repeated pleas for help and neglected to inform him about backup or rerouting features that could have saved his business.

The businessman has already filed a lawsuit in New Jersey, but the court dismissed his claims against AT&T and MCI, sending him instead to the Federal Communications Commission. Valenti claims the carriers' failure to quickly resolve the problem violated several provisions in the Communications Act of 1934.

Both carriers declined comment on the complaint last week.

Valenti's Real Estate Alternative (REA) service was designed to allow customers to access a computer over an 800 number in order to obtain listings and photographs of homes for sale.

It also provided names and addresses of service providers typically involved in real estate transactions, such as engineers, surveyors, mortgage companies and builders.

Valenti had purchased his 800 number in 1987. He first approached AT&T to obtain a distinctive number that would be available nationwide but said in his complaint that AT&T did not have a suitable number.

He then obtained the number (800) 333-0000 from MCI. The number was in service from 1987 to 1989, but it was not being used.

### The nightmare begins

Valenti launched his service to the public in September 1989 and claims to have received 200 calls per day before his problems started in mid-September of that year.

That is when AT&T, without an explanation, began sending a series of computerized calls to the REA 800 number, according to his FCC complaint.

"These calls were made every one or two minutes, thereby not only depriving REA of any opportunity to conduct its business affairs but completely devastating its entire business operation," Valenti told the FCC.

At first, Valenti went to MCI for help in determining who was making the computerized calls, but he claims it took the carrier several months to act.

"MCI's snail-like response to the crippling of REA's business

(continued on page 52)

## Ameritech unit offers 384K bit/sec service

Attempts to answer customers' call for more bandwidth than 64K at less cost than T-1 links.

**By Bob Wallace**  
Senior Editor

HOFFMAN ESTATES, Ill. — Pushed by users to plug the hole between its dedicated 64K bit/sec and T-1 1.544 offerings, Ameritech Services, Inc. will offer a 384K bit/sec fractional T-1 service throughout its five-state region by year end.

The service is called Optinet 384 and can be provisioned over twisted-pair loops or self-healing fiber-optic rings. Ameritech Services said it will be used primarily to support LAN interconnection, videoconferencing and bulk file-transfer applications.

### The cost factor

"Customers have been telling us for months they needed something with more bandwidth than 64K and less expensive than T-1," said Hardi Mannok, manager of product development at Ameritech Services. "And the

cost of the equipment we needed plunged."

The cost of the fractional T-1 card that the Ameritech telephone companies insert in the repeater bay in each central office has dropped from roughly \$1,000 last year to about \$350 a few months ago and continues to fall. "This made it cost-effective to offer 384," Mann said.

The carrier said it will equip its central offices to support Optinet 384 on a customer-by-customer basis. Ameritech Services is currently considering offering other intermediate fractional T-1 links based on customer demand.

Pacific Bell, which was among the first Bell operating companies to offer fractional T-1 service, offers several intermediate fractional T-1 speeds ("Two local carriers set to air advanced data services," NW, May 4).

Ameritech Services requires

(continued on page 52)

## Users in Pacific Northwest get frame relay service

**By Bob Wallace**  
Senior Editor

SEATTLE — Diginet Telecommunications last week announced general availability of its frame relay service, which is based on Cascade Communications Corp. STD6000 switches in this state and throughout Oregon.

The service, called PakLink, can provide users with a less expensive alternative to private lines for supporting local-area network interconnection, bulk file-transfer and videoconferencing applications.

PakLink makes Diginet the first regional carrier to announce a public frame relay offering. The Big Three, BT, CompuServe, Inc., Infonet Services Corp. and WilTel have already announced frame relay services.

"Frame relay is where the [telecommunications] industry will be for the next three years and beyond," said Dick Stroup,

Diginet's president. "We're bringing frame relay to the Northwest."

### The network

Diginet has deployed at least one STD6000 switch here and

The service can provide users with a less expensive alternative to private lines.

▲▲▲

in Spokane, Wash., and Portland, Ore., and linked them with high-speed lines. The carrier may add more cities based on user demand for PakLink.

Although initially targeted for

(continued on page 52)





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\*Sale or delivery of the IBM PS/2 Server 85 is subject to FCC approval. \*\*Server 295 does not presently support NetWare. \*\*\*The three-year on-site warranty, four-hour average response time, setup, usage and service assistance apply only to all newly announced IBM PS/2 machine types. †When serviced by IBM or IBM Authorized Personal Systems Servicers. Available Monday-Friday, 8 a.m. to 5 p.m. in your time zone. ‡In Canada, call 1 800 465-7999. IBM, PS/2, Micro Channel and OS/2 are registered trademarks and HelpWare and HelpCenter are trademarks of International Business Machines Corporation. Windows is a trademark of Microsoft Corporation. Novell and NetWare are registered trademarks of Novell Corp. COMPAQ and SYSTEMPRO are registered trademarks and ProSignia is a trademark of Compaq Computer Corporation. DELL is a trademark of Dell Computer Corporation. ©1992 IBM Corp.





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3-Year On-Site Warranty	No (1 Year)	Yes (Selected Areas)*	Yes
Service Response Time	Next Business Day	Second Business Day	4-Hour Average†
800# Assistance	7 Days/18 Hours	7 Days/24 Hours*	7 Days/24 Hours
Trade-in Program	No	No	Yes
Licensed Education Centers	No	No	Yes
30-Day Money-Back Guarantee	Yes	No	Yes

Sources: Dataquest Ledgeway, 7/92; COMPAQ News Release, 10/5/92.

\*Applies to COMPAQ ProSignia™, COMPAQ SYSTEMPRO®/XL and associated options only. This service, provided by contracted service providers, may not be available in certain geographic locations.

systems.\*\* And they're all backed by HelpWare™, a range of service and support that crushes the competition with a three-year on-site warranty, 24-hour-a-day/seven-day-a-week assistance and more.

We know you expect a lot out of a server. That's why we put so much in ours. After all, the last thing you need is for your network to not work. For more information or an IBM authorized dealer near you, call our Personal Systems HelpCenter™ at 1 800 772-2227.††



**N**ot long ago, identical fossil types were discovered in South America and Africa. A rather curious unearthing, given that the two continents are noted today for their uniquely different species. To explain this finding, the naturalist Alfred Wegener correctly proposed the idea that long before our knuckle dragging ancestors made their foray onto the planet, Earth's continents had once been a single land mass that later split apart. What we are referring to, of course, is the theory of continental drift.

Although this most fantastic of Earth's mysteries may cause alarm for some people, it doesn't trouble us in the least. Because no matter how far apart the continents may drift, N.E.T.'s enterprise networks will make certain that they all stay connected. Easily, quickly and transparently.

## 200 Million Years Ago Earth's Continents Started Drifting Apart. Today, We're Working To Bring Them Back Together.

N.E.T. offers the world's widest range of networking products and technologies. Going beyond wide area networking, effectively linking local and wide area networks. And we have more ways to simplify network management, if you get our drift.

### OUR PLAN TO REUNITE THE CONTINENTS.

When it comes to movement, the Earth takes its sweet time.

We, on the other hand, prefer to move at a more rapid pace. Take our new Asynchronous Transfer Mode (ATM) product, for example. Developed through our ADAPTIVE subsidiary, ATMx tears down the barriers that exist between LANs and WANs. So you can connect desktop to desktop, down the hall and around the world.

Furthermore, it gives you the power to connect high performance workgroup data networks today and the ability to add



*We're tearing down the boundaries between LANs and WANs. Now you can connect desktop to desktop down the hall, and around the globe.*

multimedia applications as you need them. That this technological accomplishment originates from

N.E.T. should come as no surprise. After all, ATMx has an impressive genealogy. From the broadband, high speed



*Millions of years ago, the continents were in a single mass called Pangaea. It eventually split and formed two smaller masses, Gondwanaland and Laurasia. Further splitting brought the continents to their present position. And you thought people had a hard time staying together.*

networks of our STM, to the global



communication capabilities of IDNX, to the internetworking capabilities of our enterprise routers and frame relay modules. Not to mention the access networking capabilities you get from our ADNX and SPX products.

By choosing N.E.T. as your networking partner, you get an incredible range of flexible networking solutions that can meet your objectives today and carry you into the future. Saving you a tremendous amount of time and money. Perhaps that is why N.E.T. has just swept the prestigious *Data Communications User's Choice* awards for outstanding technical capability and support.



### WHAT GOES AROUND COMES AROUND.

It seems that networking products bridging great distances may not be required 250 million years from now.

Scientists tell us that if present movements continue, the Atlantic and Indian Oceans will close up, drawing the continents together in a single immense land mass. Fascinating. But frankly, who can wait that long?



NETWORK EQUIPMENT TECHNOLOGIES

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If Another Telecommunications  
Company Offers You A  
Great-Looking Deal, Remember  
What Yankee Medical Learned:



Since 1946, Yankee Medical of Burlington, Vermont, has created orthotic and prosthetic appliances for people who've injured or lost limbs, helping them lead more productive lives. This family-run business makes an exceptional product, consulting extensively with physicians and therapists to custom-make each brace and limb.

But Yankee Medical's success is due as much to their service as to their product. They believe in treating their patients' emotional as well as physical needs, so they emphasize very sensitive, personal service.

Since it's the basis of their business, Yankee Medical couldn't cut back on service when they wanted to cut costs.

But when another telecommunications company enticed them with an attractive rate package, Yankee Medical switched from New England Telephone.

What you see isn't always what you get. They soon discovered they weren't saving as they'd been promised. In fact,

their new phone bills seemed to be higher. The reason? Their new phone company was billing Yankee Medical in one minute increments; if a call lasted only 20 seconds, they were still charged for a full minute. So while their new rates looked impressive in theory, in practice they were a different animal.

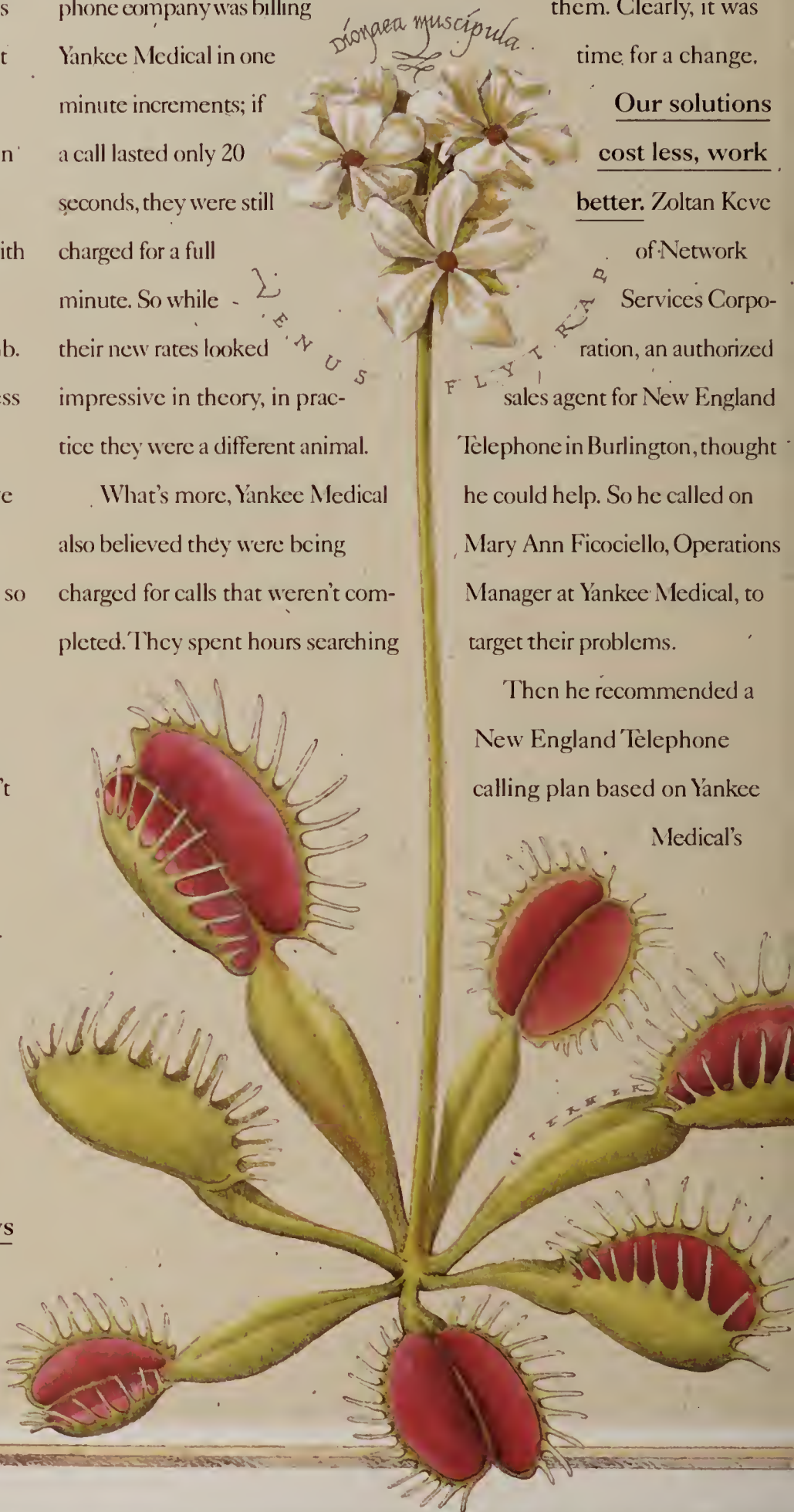
What's more, Yankee Medical also believed they were being charged for calls that weren't completed. They spent hours searching

each month's bill for these calls, and appealing for credits on them. Clearly, it was time for a change.

Our solutions cost less, work better. Zoltan Keve

of Network Services Corporation, an authorized sales agent for New England Telephone in Burlington, thought he could help. So he called on Mary Ann Ficociello, Operations Manager at Yankee Medical, to target their problems.

Then he recommended a New England Telephone calling plan based on Yankee Medical's





intrastate calling patterns. The plan's low rates and one-second billing increments save money by letting Yankee Medical pay only for the time they actually use in each call. So while the per-minute rate may not look any lower than the competition's, it ends up costing much less to use.

For further savings, Zoltan also recommended New England Telephone's 800 VALUFLEX<sup>SM</sup> Service for each of their offices. Giving each office an 800 number makes it easier for their customers to call them. It also makes it cheaper for offices across the state to call or send faxes to each other. And because all their 800 calls are billed against the Burlington office, there are substantial volume discounts.

Finally, he suggested replacing their old PBXs with a new phone system built around our Centrex Service. With Centrex, calls between offices in the same town are treated as intercom calls; no message units are used, so the company saves money again. Centrex helped them

improve customer service, too.

When one of their offices is closed, they can use the call forwarding feature of Centrex to send incoming calls to an open office, so their customers can still get through.

Yankee Medical evaluated this proposal, and switched back to New England Telephone. They realized savings of about \$1,200 on their toll bills last year. And ended their service problems.

### Service. Not lip service.

Yankee Medical found that their New England Telephone sales agent delivered the kind of personal attention their own company offered. "The Network Services Corp. people really studied our

business; that's how they were able to solve so many problems," said Mrs. Ficociello. "Zoltan is like a free consultant on our business."

Zoltan's knowledge of their problems and our solutions really paid off for Yankee Medical. They even got their

financial manager back; freed from having to spend so much time



**Yankee Medical, Inc.**  
*Established 1946*

**Product/Service:** Custom fabricators of orthotic and prosthetic appliances for people who've injured or lost limbs.

**Need:** Cut telecommunications costs.

**Solution:** New England Telephone discount toll calling plan, 800 VALUFLEX Service, and a Centrex phone system to lower costs and help improve customer service.

going over the phone bill each month, she was able to concentrate on the rest of her job.

Mary Ann Ficociello sums up her new deal nicely: "We get great New England Telephone service, for less than a discounter's price."

**Don't get trapped.** Don't be fooled by what seems like a lower price.

Call your NYNEX Systems Marketing account executive, your authorized New England Telephone sales agent, or just call us directly at 1 800 346-8809, extension 933.

We can give you a deal that's really as good as it looks. And that's another reason we're the one for you, New England.



**New England Telephone**  
A **NYNEX** Company



Don't be fooled by what seems like a lower price. Call your NYNEX Systems Marketing account executive, your authorized New England Telephone sales agent, or call us directly at 1 800 346-8809, ext. 933. We can give you a deal that's really as good as it looks. And that's another reason we're the one for you, New England.



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Call New England Telephone or one of our authorized sales agents: • Executone Information Systems (Boston) 1 800 852-3122 • Network Research and Control, Inc. 1 800 445-4541 • Taylor Telephone Service Inc. 1 800 564-4646 • US TeleCenters (617) 439-9911, 1 800 441-3211 • Computer Telephone Corporation (617) 466-8080, 1 800 225-3288 • Telenetwork Services, Inc. (401) 434-9000, 1 800 525-0032 • COMLINK Network Services 1 800 428-2212 • Community Telecommunications Corp. within ME 1 800 522-3993 • Network Services Corp. 1 800 332-0221 • Eastern Telecom, Inc. 401-946-9500, 1 800 358-6060.

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# ENTERPRISE APPLICATIONS

CLIENT/SERVER AND ENABLING SOFTWARE: DISTRIBUTED DATABASE, MESSAGING, GROUPWARE AND IMAGING

## Worth Noting

“Users should use [computer-aided software engineering] tools to model client/server applications and client/server application development tools to generate application code.”

Pieter Mimno  
President  
Technology Insight, Inc.  
Marblehead, Mass.

## Store & Forward

Microsoft Corp., in conjunction with Phoenix Systems, Inc., a professional services firm in Arlington, Va., recently announced a messaging gateway between Microsoft Corp.'s Mail 3.0 and Lotus Development Corp.'s Lotus Notes work group product.

The gateway, which is being developed by Phoenix Systems, will let Microsoft Mail and Lotus Notes users exchange text, graphics, sound and other multimedia objects through the object linking and embedding technology within Microsoft Windows.

The gateway will also support Microsoft Mail's automatic fault-tolerant directory exchange, which will allow changes in either Microsoft Mail or Lotus Notes to be automatically reflected in both system directories.

In addition, the gateway will allow Lotus Notes users to take advantage of work group products, namely Windows for Workgroups, which are based on Microsoft Mail. For example, Lotus Notes users will be able to participate in group calendaring and scheduling  
(continued on page 40)

## HP announces OSF DCE developers' environment

Works with workstations and business servers.

By Timothy O'Brien  
West Coast Bureau Chief

PALO ALTO, Calif. — Hewlett-Packard Co. has announced a set of Distributed Computing Environment (DCE) tools for its PA-RISC-based workstations and business servers.

These new tools, called the DCE Developer's Environment, are the first of a series of distributed computing products from HP that are based on the Open

been waiting for.”

### The complete set

HP's DCE Developer's Environment includes a suite of programming tools, a complete implementation of DCE core services, and a range of consulting and training services.

It supports DCE Version 1.0.1, which enables high-level communication between systems on a network without regard for the network type or location of the computer on which the data or application resides.

The programming tools provide logging and analysis to ease DCE-based application design, development and troubleshooting.

In addition, they provide an Interface Definition Language (IDL) compiler that provides additional insight into DCE application activity.

Sample DCE applications are provided to initiate development projects. By masking the complexity of a multivendor, networked environment, the DCE tools enable the development of applications that operate with clients and servers running different operating systems.

### Core services

The DCE tools are based on the Network Computing System (NCS), a set of software tools  
(continued on page 40)

The tools ease DCE-based design, development and troubleshooting.

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Software Foundation, Inc.'s (OSF) DCE, an integrated set of services intended to facilitate the development, administration and use of distributed applications.

“The traditional computing paradigm has shifted to allow data and applications to be distributed across networks, systems and users,” said Kurt Friedrich, general manager of HP's Open Systems Software Division. “DCE is truly the heterogeneous framework our customers have

## Horizon Strategies offers way to trial middleware

By Wayne Eckerson  
Senior Editor

NEEDHAM, Mass. — Middleware vendor Horizon Strategies, Inc. has introduced a scaled-down version of its Message Express software that is designed to let users sample middleware technology without spending a lot of money.

Message Express/Tour (Mx/Tour) offers a subset of the functionality within Message Express, a so-called middleware product that manages communications between applications within a heterogeneous comput-

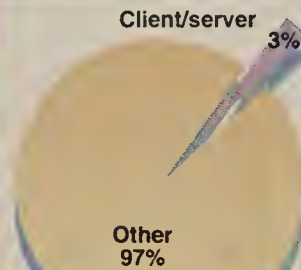
ing environment.

“Message Express/Tour is a great way to introduce people to middleware without a lot of pain,” said Hub Vandervoort, president of Horizon Strategies, based here. “It minimizes the complexity of middleware but provides enough functionality so customers get a sense of how it works.”

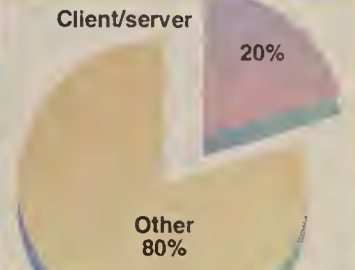
Mx/Tour is configured to let applications on two OS/2 computers interact across an LU 6.2 link. In contrast, Message Express supports communications  
(continued on page 40)

## The market for client/server software

1991 worldwide software revenue: \$45.1 billion



1996 worldwide software revenue: \$101.5 billion



Strong demand for products will increase the client/server market segment sevenfold by 1996.

GRAPHIC BY SUSAN J. CHAMPENY

SOURCE: FORRESTER RESEARCH, INC., CAMBRIDGE, MASS.

## Execs predict future of client/server mart

Chiefs also reveal product rollout schedules at Forrester's Technology Management Forum.

By Wayne Eckerson  
Senior Editor

BOSTON — The heads of some of the world's largest software companies last week described the future of client/server computing and laid out their firms' strategies to capture part of this fast-growing market at a conference here.

With some gentle arm-twisting from George Colony, president of Forrester Research, Inc., the chiefs of Borland International, Inc., Dun & Bradstreet Software, Lotus Development Corp. and Microsoft Corp. made a host of predictions and revealed product rollout schedules at Forrester's 1992 Technology Management Forum.

John Imlay, chairman of D&B Software, said the software vendors that succeed in the future will be those that have deep pockets, cultivate alliances with other vendors and actively embrace change. He said the companies best positioned to win the client/server wars are his company, Andersen Consulting, Electronic Data Systems Corp., Microsoft and Sybase, Inc.

Imlay said D&B Software will be a leading client/server contender because it has made drastic changes to succeed in the 1990s, namely effecting the merger between McCormack & Dodge Corp. and Management Science America, Inc. (MSA) three years ago to form D&B Software. Formerly fierce competitors, McCormack & Dodge and

MSA merged in order to generate enough capital and expertise to win the client/server battles of the next decade, he said.

According to Imlay, D&B Software will unveil its first client/server financial software by the middle of next year. Imlay predicted that the new software, priced at \$99,000 per platform, will provide \$17 million in new

Vendors that succeed will be those that have deep pockets, cultivate alliances with other vendors and actively embrace change.

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revenue the first year and double that the second year.

Some users attending the conference who requested anonymity chafed at the \$99,000 price tag. “It's still priced as mainframe software,” one user said.

### Lotus pushes Notes

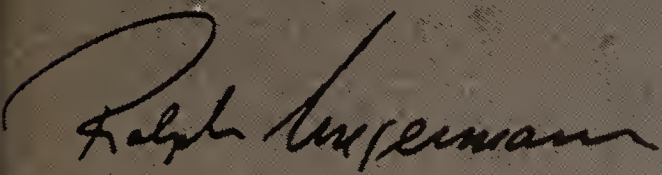
Lotus already staked its claim in the client/server market with the introduction of Lotus Notes two years ago. Lotus Chairman and Chief Executive Officer Jim Manzi said Notes shields develop-  
(continued on page 36)











# "Doing your own network integration? Time-out!"



Ralph Ungermann  
President, CEO

Most IT professionals tell me they would prefer to work with a strong network integrator rather than buying from many independent product suppliers. And yet, they buy bridges, routers, adapter cards, smart hubs and network management, etc., from dozens of suppliers. Why?  Because they equate picking an integrator with having to settle for second rate technology. The only way out is to buy networks in pieces and shoulder the nasty job of integration alone. Time-out!  At Ungermann-Bass, we don't think choosing between the "Best of Breed" and "One Stop Shopping" is a choice you should have to make.  That's why we're the first networking company to combine leading edge products with leading edge integration. At Ungermann-Bass, network integration is just as important as technology. Now you can have the "Best of Breed" from a single source.  If your company would benefit from a business partner who is as obsessed with the performance of your network as it is with product innovation, call Ungermann-Bass at 1-800-777-4LAN.

 **Ungermann-Bass**  
Your global network integration partner



## Execs predict future of client/server mart

*continued from page 33*

ers and users from the complexities of network communications, making it easier and faster to build true client/server applications.

Manzi claimed that Notes enables information systems (IS) shops to spend 70% of their time developing new applications and 30% maintaining existing applications, instead of the other way around, which is typical for most IS operations.

Lotus recently commissioned an independent firm to research the return on investment (ROI) of 20 customers that have installed Notes. The study showed that users achieved an ROI of 100% to 500% with a payback period of four months. The study took into account the cost of the Lotus Notes software, as well as the cost of new hardware, consulting services and training to implement Lotus Notes.

Manzi said Lotus is banking on the fact that Notes will be a winner in the client/server market. He said Notes currently accounts for about 10% of Lotus' annual rev-

enue, a percentage that is expected to increase significantly each year.

He also said Lotus plans to unveil a Notes-enabled version of its 1-2-3 spreadsheet in 1993 and attack the mobile computing market with applications built on Lotus Notes and cc:Mail, its local-area network-based electronic mail system.

### Objects reign at Borland

Borland's chairman and chief executive officer, Phillippe Kahn, said the future of client/server computing will be object-based because object-oriented program-

ming generates code that is reusable and modular, making it easier, faster and more cost-effective to develop complex client/server applications.

Kahn said users ought to be seriously considering implementing object-oriented development techniques within the next year. "Objects are where client/server computing was three years ago. A few leading-edge users are experimenting with the technology, but it will soon be a standard way of developing applications," he said.

However, Kahn did not cast any illusions about the challenges facing users

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**“O**bject-based computing isn't a magic wand. It's a discipline,” Borland's Kahn said.

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that want to move to object-based computing. He said users' first object-oriented applications will take 25% longer to develop than those using current development methods and many COBOL programmers will fail to make the transition.

“Object-based computing isn't a magic wand. It's a discipline. It will bring a bigger ROI, but it's not easy,” Kahn said.

In contrast, Microsoft's client/server strategy rests upon giving clients computer access to a variety of services and back-end servers through operating system functions and standard application program interfaces (API).

Michael Maples, executive vice-president of Microsoft's worldwide products group, said users can expect Microsoft to bundle more services, such as communications, data access, security, print and messaging, into Windows. Microsoft's Work-

**“A** few are experimenting with [object] technology, but it will soon be a standard way of developing applications.”

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group for Windows, which provides peer-to-peer communications for small groups of Windows users, is one example. Windows NT, due out the middle of next year, will incorporate many more services.

Maples predicted that a majority of desktop computers will either be running Apple Computer, Inc.'s Macintosh or Workgroup for Windows software by the end of next year. He also said two-thirds of all Intel Corp.-based servers will run Windows NT by the end of 1993 and all desktops will be running Windows NT by 1999.

Maples added that Microsoft's Windows Open Services Architecture is defining standard APIs for Windows applications so that users can access services provided by other vendors' products. ■



(What is it?)



**It's an SNA gateway.** (That's nothing new.) **It's also a local router.** (Excuse me?) **It's an SNA gateway and a local router** (You mean in one product?) **in one product. So it provides you with two solutions in one:** (Let me guess; the functionality of a gateway along with the performance of a router.) **the functionality of a gateway combined with the high-performance of our router's SPARC processor.** (I was close.) **Since this new product** (I think it should be called a gateway-router.) **performs two functions at once, it offers unprecedented levels of administrative convenience and manageability.** (But does it access multiple LANs?) **It also accesses multiple LANs, including Token-Ring, Ethernet, and LocalTalk,** (Ask a stupid question...) **and supports mixed PC environments such as Windows, Mac, and DOS.** (Holy Toledo.) **Naturally, our Netway gateway-router** (Hey, that's *my* name for it.) **can route Novell IPX and AppleTalk protocols,** (And?) **and comes complete with powerful 3270 services like terminal and printer emulation.** (I wonder who came up with this thing.) **As you might have guessed by now, the company behind this revolutionary product is Avatar,** (I should have known.) **leaders in SNA connectivity for over a decade.** (Must be about time for the obligatory 800 number.) **For more information, and our free "Gateway-Router Guide to Network Manageability," send in the coupon or call 1-800-AVA-3270.** (A free gateway-router guide? You must have read my mind.)

Avatar

NAME, TITLE

COMPANY

ADDRESS, PHONE

CITY, STATE, ZIP

JNW4

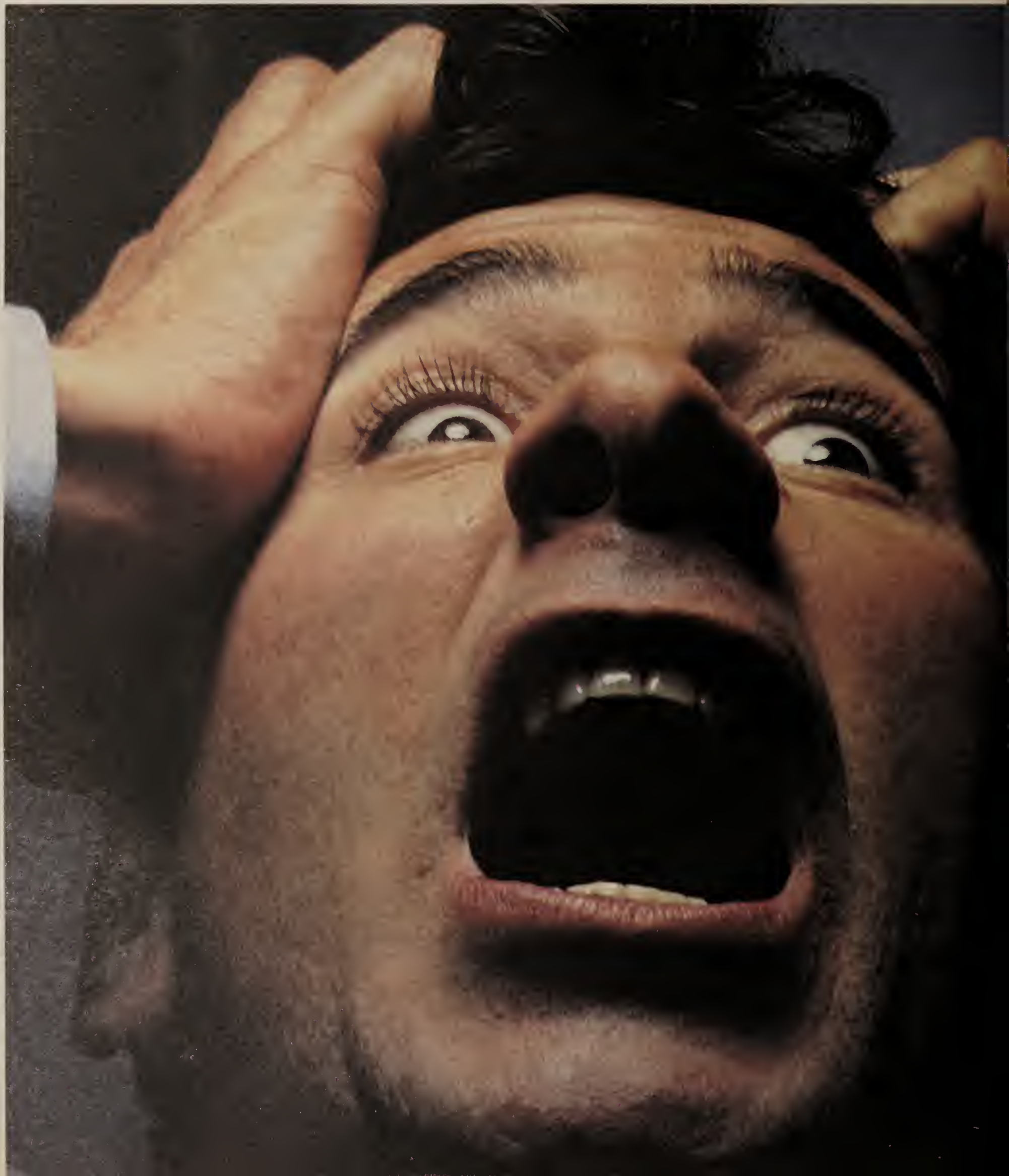
Do you need 3270 emulation for: ☐ Windows ☐ Mac ☐ DOS

Which protocols do you need to route: ☐ Novell IPX ☐ AppleTalk ☐ TCP/IP

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Reliable mass storage may not always be top of mind; but if something goes wrong, it's always top of voice.

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JetStore comes from HP, the market leader in DAT drives. In fact, one out of every two drives sold is from Hewlett-Packard. What's more, we helped develop the Digital Data Storage (DDS) format, which is now the industry standard.

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For more information on HP JetStore tape products, please call 1-800-826-4111, Extension 7102.



**HEWLETT  
PACKARD**



## HP announces OSF DCE tools

*continued from page 33*

originally developed by HP's Apollo division and which now serve as the core of OSF's DCE.

NCS allows users to distribute parts of a single application to computers best suited for specific tasks. OSF selected NCS to provide the underlying communications mechanism for DCE.

The DCE core services is a set of application program interfaces used by applica-

tion developers to write DCE-based applications.

HP claims that its DCE core services have been tested for interoperability to ensure compatibility with OSF's DCE reference platforms.

HP's DCE core services components include services supporting remote procedure calls, distributed directories, security, a multiple application process control capability called threads and a time service, which synchronizes all system clocks on a network.

Future DCE releases from HP will in-

clude additional capabilities, such as a distributed file system, which HP expects to make available by mid-1993. HP will release DCE on HP-UX 9.0, the newest version of its Unix system-based software, in a phased roll out.

In addition, HP expects to offer DCE on its HP 3000 MPE/iX platform next year.

HP expects to ship the DCE developers' environment during the first quarter of 1993.

Pricing ranges from \$395 for the core services to \$3,100 for some of the tools. □

## Horizon offers way to trial middleware

*continued from page 33*

between applications running on multiple nodes and computing platforms in a multi-protocol net.

Sample or prototype applications developed with Mx/Tour can be ported to any of the 12 computing platforms currently supported by Message Express, which include IBM's MVS, OS/400, AIX, OS/2 and LAN Server, Digital Equipment Corp.'s VAX, Microsoft Corp.'s Windows and DOS, Unix System V and Novell, Inc.'s NetWare.

Like Message Express, Mx/Tour offers message queueing and deferred message delivery, message tracking and logging, and a simplified application program interface that has just four verbs.

Mx/Tour costs just \$2,399, well below the price tag of Message Express, which can cost upward of \$35,000 per platform.

According to Vandervoort, until now, it has been expensive for users to experiment with middleware. Either users purchase Message Express outright and hire consultants to help install the product or they sign up for a rapid development workshop in which Horizon staffers help companies build a prototype distributed application. A workshop can last several days and cost upward of \$20,000, Vandervoort said.

Providing evaluation copies of Message Express often backfired because the product's complexity made it difficult for users to implement it successfully unless they had significant expertise in distributed computing.

"Mx/Tour is for the guy on a tight budget who just wants to kick the tires of Message Express and take it for a test drive before making a commitment to purchase," Vandervoort said. □

## Store & Forward

*continued from page 33*

with users of Microsoft Schedule+ for Windows. Since Schedule+ uses the Microsoft Mail transport to distribute meeting requests, the gateway will allow Lotus Notes users to receive those requests and respond to them.

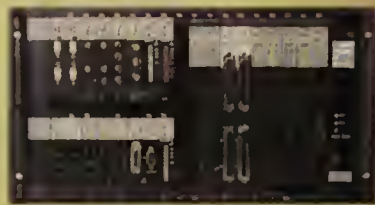
The gateway is currently under development, with beta testing scheduled to begin shortly and product delivery expected in early 1993. For additional information, contact Phoenix Systems at (703) 532-0820.

Vinzant, Inc. recently announced a new version of its Event Control Server, which is local-area network-based job scheduling software that can run multiple OS/2 jobs simultaneously.

Version 2.0 allows users to program keystrokes to initiate remote job applications. It also lets users define up to 10 jobs that must be completed before a certain job is initiated, and it automatically repeats failed jobs.

Version 2.0, which runs on OS/2 and DOS computers in Novell, Inc. NetWare, IBM LAN Server and Microsoft Corp. LAN Manager networks, is priced at \$995 per job server license or \$4,995 per site license. □

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# INDUSTRY UPDATE

VENDOR STRATEGIES, MARKET TRENDS, ALLIANCES AND FINANCIALS

## Worth Noting

“We believe this is a great day in the history of telecommunications.”

**Craig McCaw**  
Chairman and  
chief executive officer  
McCaw Cellular  
Communications, Inc.  
Commenting on AT&T's proposed  
alliance and investment in McCaw

## AT&T, CLI to offer analog videoconferencing chipset

Product employs GVS, gives technology boost.

By Joanne Cummings  
Senior Writer

SAN JOSE, Calif. — AT&T and Compression Labs, Inc. announced they are developing a chipset, based on their Global Video Standard (GVS) technology, that will enable third-party developers to build desktop videoconferencing systems that use analog phone lines.

The move is an effort to make GVS a de facto desktop videoconferencing standard, according to an AT&T spokeswoman.

“By making the technology available as a chipset rather than as a board-level product, we’re making it easier for other companies to use it in a variety of products,” she said. “And every product that uses GVS will be able to interoperate.”

AT&T has proposed the technology to ANSI and the Consultative Committee on International Telephony and Telegraphy for inclusion in upcoming standards, and is expected to present GVS to the International Standards Organization this month.

The chipsets, which will be offered through AT&T Microelectronics, will include integrated circuits for video compression,

audio compression and modem technology, as well as host processor support and interface specifications.

The chips make it possible to support full-motion color video links at 19.2K bit/sec over dial-up analog links.

AT&T currently uses GVS technology in its VideoPhone 2500, a video-capable handset unveiled in January, and CLI has incorporated it into its Cameo Personal Video System, an Apple Computer, Inc. Macintosh-based desktop videoconferencing system also announced in January (“New devices to boost desktop video mart,” NW, Jan. 13).

The VideoPhone 2500 is targeted primarily at the consumer market, but the spokeswoman said that making the chipset available to third parties could result in products designed for business applications, such as personal computer-based videoconferencing systems.

She said AT&T is currently negotiating with some third parties interested in buying the chipset, but she declined to name them.

The chipset is expected to be available in the second half of 1993. Pricing has not been set. ■



“We want to be able to tell the community, here’s a plan for a National Message Transfer Service.”

Ella Gardner  
Technical staff member  
Mitre Corp.

## User seeks backing for X.400 proposal

U.S. CCITT study group asks carriers to support address plan for number portability in messaging.

By Ellen Messmer  
Senior Correspondent

TAMPA, Fla. — Users active in a U.S. CCITT study group on message handling will meet here next month to ask service providers to voluntarily support a plan that would bring number portability to X.400 addresses.

Members of the study group, which includes the U.S. government, The Boeing Co., Chevron Corp. and Citicorp, are proposing that carriers and users adopt an X.400 address plan eliminating the need to identify user service providers in the address format. The plan would free users from having to change their X.400 addresses if they switch carriers and lead to a national backbone for messaging.

The CCITT standards group proposing the idea, the Message Handling Systems Management Domain Subcommittee, will present the plan for the U.S. National Message Transfer Service at an open forum on Dec. 11 at IBM's Advantis headquarters here.

“It tries to establish some guidelines on how a national messaging environment could, and perhaps should, work,” said Gary Rowe, a principal at consultancy Rapport Communication, Inc.

“Today, it’s difficult to get X.400 messages from one service provider to another,” he said. “There needs to be a level of consistency among service providers. This is an infrastructure issue — to make messaging easy to use and widely available.”

The national messaging back-

bone plan asks users and vendors to support an option in the 1988 X.400 standard for message addressing.

Under the standards-based plan, the public service provider — called the Administration Management Domain (ADMD) — would be identified in the address format as simply “ADMD equals single space,” rather than by the carrier name, as is the case with the current carrier-dependent method.

With this plan, the user’s private messaging system — called the Private Management Domain (PRMD) — would no longer have to make public the carrier being used or need to enter information to access the X.400 gateways of other ADMDs, Rowe said.

The creation of a Message Transfer Service would bring a level of ease and interoperability to messaging that has been achieved in voice telephony, he pointed out.

The group intends to submit the Message Transfer Service proposal to the Consultative Committee on International Telephony and Telegraphy so that other countries can also consider it for implementation.

Karen Day, staff business systems analyst at Allied-Signal Aerospace Corp.’s Kansas City, Mo., division, called the national messaging backbone plan a benefit to large users. “It makes sense here in the U.S. where we have multiple service providers,” Day said.

The subcommittee’s chair-  
(continued on page 44)

## People & Positions

**Hellene Runtagh**, president of **GE Information Services**, has been given the additional responsibility of chief information officer (CIO) at **General Electric Co.** As CIO, a new position at GE, she will be responsible for the firm’s corporate information technology division, which provides internal telecommunications and networking services for GE.

**Terry Lautenbach**, senior vice-president at **IBM** and a member of the IBM management committee, will retire from the company at the end of the month after 33 years in management positions. IBM has not yet named a replacement for Lautenbach, who currently has responsibility for worldwide manufacturing and development, as well as U.S. marketing and services.

**Jeffrey Burke** has been named vice-president of network and professional services within the newly formed Network and Professional Services organization of **Xerox Corp.**’s U.S. Customer Operations. Previously, Burke was U.S. business manager of network integration services at Digital Equipment Corp. In his new job, Burke will be responsible for design, installation management and organizational support for customer networks, multivendor ser-

(continued on page 44)

## INDUSTRY BRIEFS

**Cisco posts strong numbers.** Cisco Systems, Inc., a Menlo Park, Calif., router vendor, last week reported revenue of \$126.4 million for the fiscal 1993 first quarter ended Oct. 25, nearly double the \$63.6 million it recorded in the first quarter last year. Cisco’s earnings more than doubled to \$33.2 million from \$15.5 million over the same period last year.

**Artisoft expands reseller effort.** Artisoft, Inc., a Tucson, Ariz., vendor of peer-to-peer networking software, last week announced a new Five Star Connectivity Reseller Program designed to accommodate resellers and system integrators specializing in the installation of large, complex networks. The program will involve the provision of training; sales leads for Artisoft LANtastic networks of 20 or more nodes; enhanced technical support, including a toll-free support number; beta-test site opportunities; and advisory council membership. The new program, which features a \$999 enrollment fee, will complement an existing program for resellers that focuses on basic networking issues and platforms.

**Novell extends Reach.** Reach Software Corp., a Sunnyvale, Calif., vendor of electronic mail and work flow application  
(continued on page 44)





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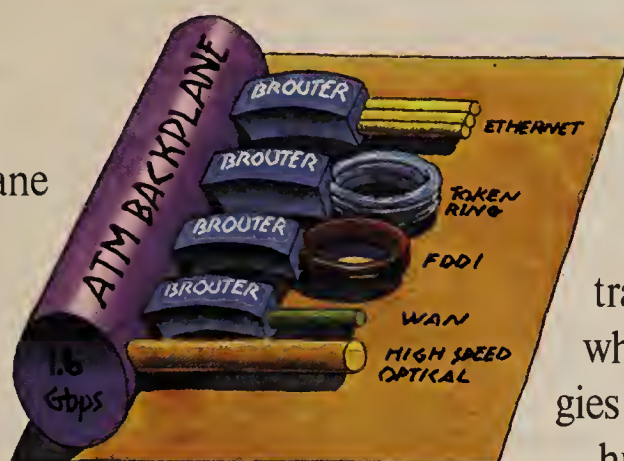
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hubs. Instead, the Enterprise Hub's segmented backplane lets you integrate and internetwork multiple Ethernet, Token Ring and FDDI LANs all within the same hub.



*The Enterprise Hub's ATM Backplane architecture allows incremental expansion of your network to utilize over 2 Gbps of bandwidth.*

future networks that combine voice, video and data traffic. And when technologies like gigabit hub-to-hub links and ATM interfaces are

ready, your hub's ready for them.

### MORE INTELLIGENT MANAGEMENT.

There's nothing too smart about expanding your network to the point where it grows beyond your control. Here again, the Enterprise Hub is the intelligent choice.

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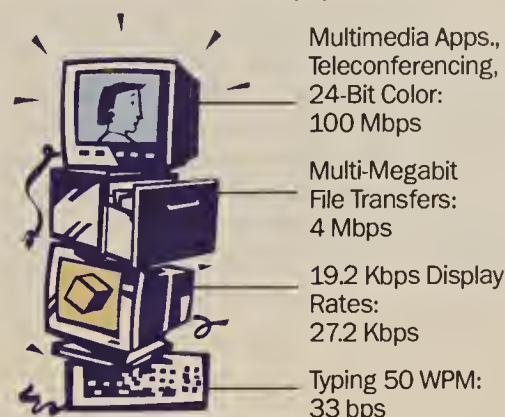
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Network managers tell us they need absolute system reliability. You'll get no argument from Hughes. Instead what you'll get are system safeguards like redundant load-sharing power supplies. Hot-swappable

modules. Redundant hub-to-hub links. So while network users enjoy great performance, network managers enjoy great peace of mind.

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Even if you're focused on your company's current needs, experience has taught you enterprise networking needs are unpredictable. So the hardware investments you make today should pay dividends for many years.



*In the future, as complex applications demand greater bandwidth, the Enterprise Hub gives network managers the flexible architecture they need to make migration simple.*

It's time to think big. Look at the Enterprise Hub's 2 Gbps bandwidth versus your typical hub's 10 or 20 Mbps. You'll find a huge difference in terms of performance. But in terms of price, you'll find the difference little to none.

Call 1-800-395-5267 for more information about the Enterprise Hub and Hughes LAN Systems' big picture networking solutions.

### STEER CLEAR OF TRAFFIC.

Segmented hubs have become the network's highway system. So integrating bridges and routers within the hub makes perfect sense. However, that can result in the type of backplane traffic that resembles rush hour in L.A.

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## Industry Briefs

*continued from page 41*

software, last week said it has garnered \$4 million in second-round financing, including an investment from Novell, Inc. Other investors included Bay Partners of Cupertino, Calif.; InterWest Partners of Menlo Park, Calif.; and J.F. Shea and Co. of Walnut, Calif.

The funding will be used to build the sales and marketing organization of Reach for its MailMan and WorkMan product family.

**BellSouth to cut jobs.** BellSouth Corp. has announced plans to cut its 83,000-person telecommunications unit work force by 8,000 employees before 1996. The cuts, which are expected to be split evenly between management and nonmanagement jobs,

are designed to reduce operating costs and streamline decision making at BellSouth Telecommunications, Inc., which includes the Southern Bell and South Central Bell telephone operating companies.

About 825 jobs in the company's comptroller organization and another 150 in economic analysis and forecasting have already been targeted to be cut. Much of the work force reduction is expected to occur via attrition, a company spokeswoman said.

BellSouth also announced plans to merge its corporate staff with the headquarters staff of its BellSouth Enterprises, Inc. business unit, which includes the company's cellular operations.

**SMDS in Pacific Rim.** The SMDS Interest Group has announced plans to form a Pacific Rim SMDS Interest Group that

will meet for the first time on Nov. 24 in Taipei, Taiwan.

The group's members will include post, telegraph and telephone administrations, as well as other service providers, equipment vendors and users seeking to advance Switched Multimegabit Data Service in the Pacific Rim, where SMDS trials are already being conducted and planned.

The group's efforts are expected to complement those of the U.S.-based SMDS Interest Group and European SMDS Interest Group.

**OSF, OMG reciprocate.** The Object Management Group (OMG), based in Framingham, Mass., and the Open Software Foundation, Inc. (OSF), based in Cambridge, Mass., last week announced a reciprocal exchange of membership in each other's orga-

nization. Now that the OMG is a member of the OSF and vice versa, the groups will be able to work more closely as they forge ahead with specification requirements work.

OMG is a 285-member group focused on object technology specifications, while the OSF is a 350-member group that develops de facto network and systems management specifications and software.

**IBM, Raylan team.** IBM of Armonk, N.Y., and Raylan Corp. of Menlo Park, Calif., last week announced an agreement under which IBM will refer its customers to Raylan for fiber optic-based token-ring net equipment. Specifically, IBM will point users toward Raylan's 1600 Series token-ring wiring hubs, adapter cards and Simple Network Management Protocol products. ■

## User seeks backing for plan

*continued from page 41*

woman, Ella Gardner, a member of the technical staff at Mitre Corp., which represents the federal government's interest, said ADMs will have to set up service agreements with one another on a bilateral basis to make the plan work. "They will have to exchange routing information," she said. "There will be bilateral agreements between each pair involved."

Rowe acknowledged that the plan may require service providers to revise their routing systems and share information that they may consider proprietary.

But several of the service providers familiar with the plan have expressed interest, Gardner said, noting that Advantis, AT&T, Bell Atlantic Corp., BT, MCI Commu-

## People & Positions

*continued from page 41*

vices and national maintenance center strategy at Xerox.

**William Maxwell** has joined **Intertel Communications,**

**Inc.**, a Denver-based alternative access provider, as president and chief executive officer of the company's **Teleport Denver, Inc.** operating subsidiary. Maxwell replaces Joe Moreland, who died in an automobile accident in September.

Maxwell previously was the se-

nior marketing executive for **Wil-Tel**, a Tulsa, Okla., carrier.

**Dirk Kabcenell**, formerly **Oracle Corp.**'s vice-president of relational database management system products, has been named senior vice-president for Oracle's database and languages division.

Kabcenell will be responsible for all products developed in that division of the Redwood Shores, Calif., vendor.

He will report to Lawrence Ellison, Oracle's president and chief executive officer, and will serve on Oracle's management committee.

**Chipcom Corp.**, a Southborough, Mass., wiring hub vendor, has added two new members to its board of directors. Those board members are: **Victoria Brown**, a former Timeplex, Inc. executive and currently chairwoman of Cascade Communications Corp.; and **Frank Onians**,

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1/4-inch Data Cartridge Tape Technology. The practical, reliable



nications Corp. and Pacific Tele-sis Group have regularly attended planning meetings over the two-year period. "Their view seems to be, 'If that's what the market wants, we'll provide it,'" she said.

"It's up to users to talk to their service providers and tell them how important this is to them," Rowe said. He urged users and vendors to attend the Tampa meeting. Information about the meeting can be obtained by calling Day at (816) 997-5869.

The question of what organization will serve as the registration authority to issue the unique identifiers for ADMDs and PRMDs still remains unresolved. Ensuring the uniqueness of each PRMD name is important since a large PRMD may have hundreds of thousands of users behind it who expect their messages to be routed to the proper recipient across

a national backbone.

"There is no national registration authority to handle PRMD names," Rowe said, noting that ANSI and the CCITT Study Group D represented by the U.S. Department of State are working to solve that piece of the addressing puzzle.

Rowe said ANSI last year began registering organization names for a fee, but they are not official PRMD names. He said ANSI has stated interest in becoming the official U.S. registration authority and is expected to present a technical proposal to that end soon.

Since many users have already paid ANSI to register their organization name as unique, Rowe said he is optimistic that those registered names will be accepted as PRMD names if ANSI becomes the U.S. authority for management domain names. ☐

## Clinton's high-tech plan to take backseat to economy

By Cara Cunningham  
IDG News Service, U.S. Bureau

LITTLE ROCK, Ark. — With President-Elect Bill Clinton focusing much of his early efforts on the economy, his proposed high-technology policy initiatives are not likely to make the new administration's agenda in its first 100 days.

During his campaign, Clinton outlined a technology policy designed to bolster U.S. economic competitiveness.

These initiatives include government investment in national communications networks or "information superhighways," diverting federal funds from defense research and development

to civilian R&D, creating "high skills" education and training programs and investing in private industry consortia.

According to a Clinton spokesman, this technology policy is a priority with the new administration but when and how it will be implemented remains unclear.

"I can't say that on Day 93 [of the Clinton administration], he will do the high-performance communications act," said the



spokesman at Clinton headquarters here. "What I can say is that the economy and job creation is very important, and Clinton and [Vice-President-Elect Al] Gore view the technology policy as having a role to play in that."

One of the new administration's immediate priorities that may have an indirect effect on the high-technology industry is its emphasis on incremental investment tax credits, the spokesman said. This would offer a 10% tax break to companies that invest in new plant and equipment, including computer systems.

"The priority at the top is getting the economy going," the spokesman said.

"One of the constraints that the incoming administration faces is a budget deficit of \$300 billion, which Clinton wants to reduce by half over the next four years," he said. "So actions that stimulate additional private-sector investment are being looked at more closely." ☐

the retired president of Rolm Europe, Ltd.

**John Pucknell** has been named vice-president of research and development at **Syntellect, Inc.**, a Phoenix vendor of interactive voice response systems. Previously, he was **Unisys**

**Corp.**'s director of engineering.

**BlueLine Software, Inc.**, a Minneapolis-based developer of systems software for IBM networks, has named **Mark Caprio** vice-president of sales. Caprio, formerly district manager for Amdahl Corp., will be responsible

for BlueLine's sales operations nationwide.

**Prism Technology, Inc.**, a Waltham, Mass.-based systems integrator, has initiated a restructuring under which it will adopt a new name, **Prism Networks, Inc.** **Kenneth Miller**, formerly

general manager for local-area network internetworking at Motorola-Codex, Inc., has joined the firm as president and chief executive officer. **Kevin O'Neil**, formerly the president and CEO of Prism Technology, will serve as vice-president of technology in Prism Networks. ☐



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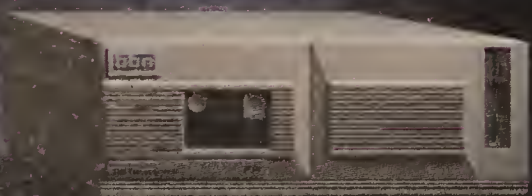
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# MANAGEMENT STRATEGIES

MANAGING PEOPLE AND TECHNOLOGY: USER GROUPS AND ASSOCIATIONS

## Worth Noting

“Management is not management unless you have control, and the amount of control we have in net management systems today is basically on/off or operator intervention, and that’s not enough.”

**John Puckett**  
Manager of engineering  
and network services  
The Foxboro Co.  
Foxboro, Mass.

## Selected portions of The Bill of Rights and Responsibilities for Electronic Learners

### Article I: Individual rights

**Section 1:** A citizen’s access to computing and information resources is a right rather than a privilege. Access to computing or information resources shall not be denied or removed without just cause.

**Section 2:** The right to access includes the right to appropriate training and tools required to effect access.

**Section 3:** All citizens shall have the right to be informed about personal information that has been collected about them, the right to review and correct that information, and the right to control the distribution of that information.

**Section 4:** The constitutional right to freedom of speech applies to citizens of electronic communities.

### Article II: Individual responsibilities

**Section 2:** It shall be each citizen’s personal responsibility to recognize (attribute) and honor the intellectual property of others.

### Article IV: Institutional responsibilities

**Section 1:** Institutional members have a responsibility to provide their community with legally acquired computer resources.

**Section 2:** Institutions have a responsibility to develop, implement and maintain security procedures sufficient to ensure the integrity of individual and institutional files.

GRAPHIC BY SUSAN J. CHAMPENY

SOURCE: EDUCOM, WASHINGTON, D.C.

## Educom drafts model net ‘bill of rights’

University consortium clearly sets out rights of faculty, students regarding net access, info mgmt.

**By Ellen Messmer**  
Senior Correspondent

BALTIMORE — The university consortium, Educom, pointing to the growing significance of computer communications in learning, has drafted a network “bill of rights” as a policy model for academic institutions.

The Bill of Rights and Responsibilities for Electronic Learners declares that computer and network access should be a right of students and faculty, not a privilege, and that users should have the right to control distribution of information collected about them.

The document may not only end up changing college policies, but could influence U.S. government thinking on the direction of the National Research and Education Network.

“This is the start of things that need to happen in this society,” said Sally Webster, professor of computer applications at the State University of New York College of Environmental Science and Technology, a member of the Educom task force that drafted the document, three years in the making.

“We think access — if it isn’t already a right — will soon be a

right,” Webster said. “In the future, much of the information will lie beyond the walls of the institution. To be well-educated, you will have to have access to what lies beyond. What we don’t want is to make plans that would create have and have-not learners.”

While seeking to further equality in education, the document also raises thorny issues of cost and legal liability that colleges face in implementing its ideals. It says institutions must maintain security procedures ensuring file protection, train users on computer systems and make sure they “understand the ethical and legal resources of the resources.”

The document also states both users and institutions must be aware of electronic document intellectual property rights and requires users to “verify the integrity and completeness of information” that is digitally manipulated.

College administrators applauded the document’s ideals, but predicted there would be problems putting them into practice. At a discussion during the Educom ’92 conference here,

(continued on page 48)

## MANAGING TECHNOLOGY

BY JAMES CHALLENGER

## Two or more jobs for one person

A new phenomenon is occurring in today’s workplace, and managers that take advantage of it will be better able to respond to change and make their employees’ jobs more fulfilling.

Set in motion by the recession, the new development is called “two or more for one,” and is manifested in the idea that two or more types of jobs can be assigned to the same person.

As an example, a manager may need someone in the role of a technician only two days a week and need a quality control manager for the remainder of the week. The manager benefits by getting one worker to perform two jobs, and the individual benefits by increasing his value to the company.

The trend toward developing workers with multiple skills originated from the need for companies to stay abreast of increasing worldwide competition. Even before the recession, many firms were downsizing in order to achieve economies of operation. The impact of competition from abroad in addition to intensified domestic competition has forced U.S. companies to become more cost-effective while improving the quality of their products and services.

In that type of an operating climate, the focus has shifted to the need for experienced, versatile workers who can perform more than one job and make an immediate contribution to the bottom line.

This trend may require a re-evaluation in terms of hiring and job classification areas. In the past, the emphasis has been on job specialization and a detailed job description. Job descriptions will still be used, but they are likely to reflect the new need for versatility.

This emphasis can help companies build a cadre of workers who can change assignments quickly, work where needed and assist the company in responding rapidly to changing market conditions. Responding to changing markets is especially important during a period of recovery, when competitors may threaten to outdistance you.

Versatility can also be a factor in the improvement of employee morale. Many employees cite recognition of their efforts as the foremost requirement for a new job.

It is part of what we term “psychic income,” referring to those elements of the job other than salary and benefits.

People want recognition that they are making creative contributions to their job and company. When they work on two or more jobs, they have an opportunity to put their personal imprint on several areas of operations, increasing their potential for receiving more of the intangibles associated with psychic income. When workers have an increased sense of identification with the company, they are also likely to become more productive.

From management’s standpoint, the knowledge of how to perform more than one job is important to the company in the provision of backup support for key functions. In cases when one worker is suddenly incapacitated or absent from the job, there will be someone else capable of stepping in. The presence of a seasoned group of managers also aids in succession planning for replacements.

Among the prime candidates for the two-or-more-for-one category is the older worker, aged 50 and up. That individual often has work experience that is likely to include the knowl-

(continued on page 48)



## Manager Minutes

The first annual New York Technology Summit (NYTS) on telecommunications, networking and computing will be held at New York’s Jacob Javits Center Dec. 8-11. NYTS will consist of SuperSessions, which will feature a series of roundtables examining such technologies as supercomputing and multimedia, balanced by vendor presentations from firms such as IBM, Intel Corp., Microsoft Corp., Novell, Inc. and Sony Corp. about their future visions of technology.

In addition, NYTS will hold several in-depth seminars on various aspects of telecommunications, networking and computing that will enable attendees to address technology experts in panel discussions.

NYTS will also sponsor four additional conferences at the same time on multimedia, financial industries technology, voice messaging and videoconferencing.

Full registration costs \$495. For more information, contact American Expositions, Inc. at (212) 226-4141. ☐



## Educom drafts model net 'bill of rights'

*continued from page 47*

several administrators pointed out that network access remains a privilege at their institutions.

Michael Lewis, director of computer education at Bard College in Annandale-on-Hudson, N.Y., said the document would assist Bard in developing a user policy for the campus backbone soon to be completed. No students will have Internet access until all can be granted access to avoid

charges of favoritism. But Bard still treats access to the network as a privilege, Lewis said, adding, "What would change if we considered it a right?"

Poor schools will have a hard time with the document, Lewis said. "I have the concern that if we start to see these things as rights, how can we cope with the cost issues associated with it?"

At the University of Michigan in Ann Arbor, students are given electronic mail as a basic service, but access is not considered a right, said Carl Berger, the director of instructional information. He said the docu-

ment might result in universities having to fend off legal challenges from disgruntled students. "Students could argue that their right to use computers has been abridged because they had to wait so long," Berger pointed out.

But Berger also said the educational benefits to computer-supported learning are becoming increasingly apparent. Research indicates that the use of educational software can bridge the gap in the learning levels of college-enrolled minority students, he said, adding, "Are we discriminating if we don't use that technology?"



"Uh-Oh..." Donna, Accounting



"What The..." Dan, Drafting



"Hey!" Todd, Shipping



"Whoa!" Jan, Production

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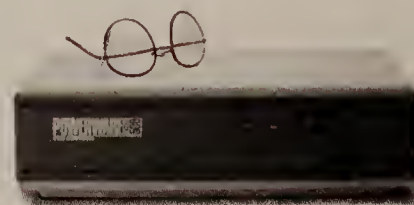
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## The framers of Educom's Bill of Rights and Responsibilities for Electronic Learners include representatives from:

California State University, Long Beach  
Indiana University  
Kalamazoo College  
Massachusetts Institute of Technology  
Stanford University  
State University of New York College of Environmental Science and Forestry  
The University of Southwestern Louisiana  
University of Notre Dame  
University of Oregon  
University of Virginia

SOURCE: EDUCOM, WASHINGTON, D.C.  
GRAPHIC BY SUSAN J. CHAMPENY

The University of Notre Dame in South Bend, Ind., which considers access a privilege, is also concerned about legal vulnerability, said Marilyn Van Bergen, project coordinator in the university's office of the assistant provost.

However, the Educom document appears to dovetail well with policy already in place at the Massachusetts Institute of Technology.

"At MIT, every student has the right to the Athena academic computing resources, such as access to library catalogs," said Janet Daley, information officer for MIT academic computing services. "It's our responsibility to provide those services. We provide equal access to training, with special machines for students with physical impairments."

But the administrators agreed that network access could not be viewed as limitless; even MIT proved reluctant to include a service such as supercomputer access in an interpretation of basic rights. Administrators also pointed out that the document would undoubtedly provoke a lot of soul-searching at universities where faculty frequently treat themselves differently from students in terms of rights. □

## Two or more jobs for one person

*continued from page 47*

edge of how to perform more than one job. The employer gains the advantage of hiring someone who can provide value-added performance as well as fulfill the new demand for versatility in the workplace. Employers are receptive to skilled older workers because they are able to fit in and make immediate contributions.

With more versatile workers, competitive needs are likely to be paramount in the planning of work schedules. Dual responsibilities are likely to require a changing mix of hours from week to week and month to month.

All in all, the new workplace will constitute a different type of working environment, one that places a premium on the strengths of versatility and adaptability. □

*Challenger is president of Challenger, Gray & Christmas, Inc., an international outplacement consulting firm in Chicago.*



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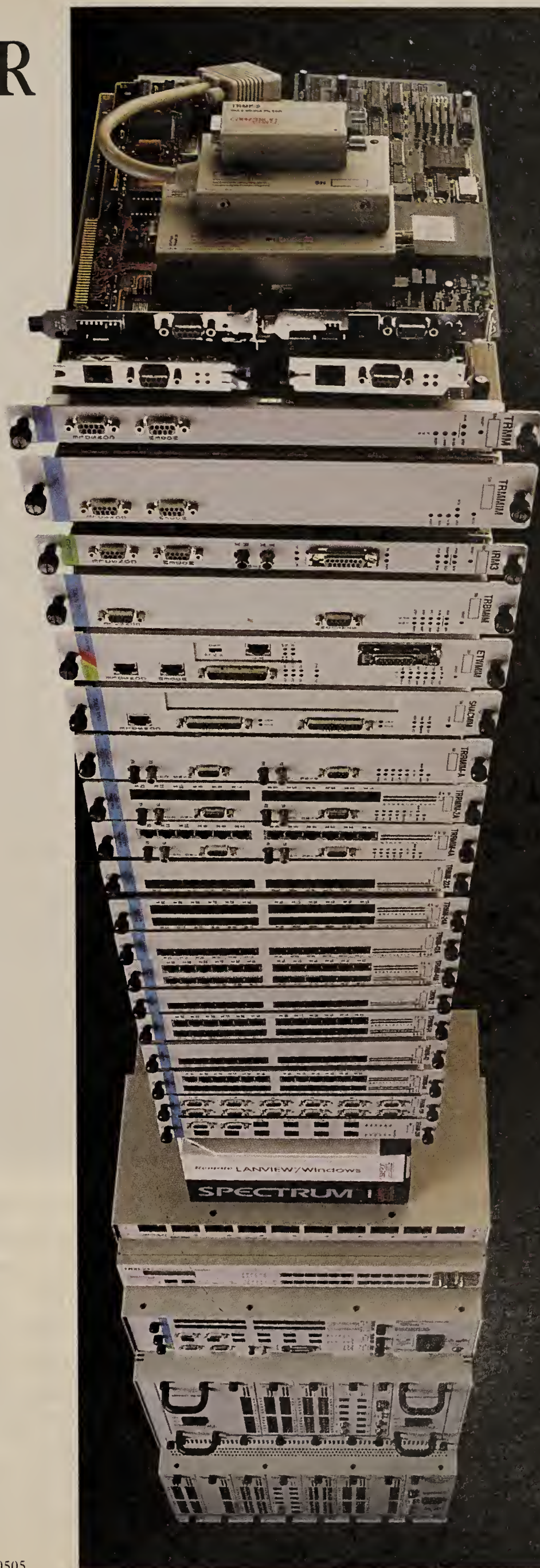
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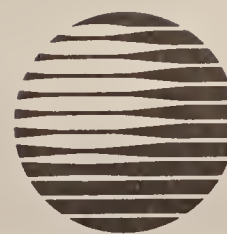
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## RBHC unit offers 384K bit/sec service

*continued from page 29*

T-1 access to the nearest Optinet 384-equipped central office. The 18 remaining 64K bit/sec channels are blocked by the carrier at the central office to prevent use.

To use the service, customers will need either a fractional T-1 multiplexer or an upgrade to a T-1 multiplexer, in addition to data service unit/channel service units in both cases.

The carrier's 384K bit/sec service costs

substantially less than its T-1 offering. A one-mile end-to-end Optinet 384 circuit with interoffice transport costs 9.5% less than the same length T-1. A user with a 20-mile Optinet 384 circuit would save nearly 30% over a T-1 of the same length.

Optinet 384 users will pay \$225 a month for the first premises-to-central-office link, \$185 for the second and \$164 for the third, as well as a \$38 channel mileage transport charge between companies and a \$9 monthly charge per interoffice channel mile.

Users that sign 12-, 36- or 60-month

term plans pay the same channel mileage transport and channel mileage charge per month but pay less for their first one to three local distribution channels.

Ameritech Services uses the T-1 extended superframe format (ESF) to monitor the links' performance. ESF will enable the carrier to spot degradation in line quality and test circuits without taking the facility out of service.

Optinet 384 is a clear-channel service that uses bipolar eight zero code substitution line coding, meaning customers obtain the full 64K bit/sec channel for data

transmission. The older alternate mark inversion coding scheme uses 8K bit/sec for transmission management, leaving only 56K bit/sec for data transmission.

Ameritech Services can provision Optinet 384 in seven business days — the same as for T-1 installation. If the BOC does not make that interval, it will refund the onetime \$1,000 installation charge for the link, Mann said.

The company will not charge users extra if their Optinet 384 link runs over a self-healing fiber ring, which boasts higher service availability than copper. □

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## Realtor blames carriers for misuse

*continued from page 29*

was patently unreasonable and in violation of [the Communications Act]," Valenti told the FCC. "MCI failed to take any steps to rectify the problem and deliberately continued to disregard the devastating effect that the AT&T calls had on REA's business activities."

In the meantime, Valenti says he approached the Federal Bureau of Investigation, which determined in November 1989 that the calls were originating from AT&T. He claims that AT&T admitted it was the source of the calls.

Based on this information, in November 1989, Valenti filed a complaint against AT&T and MCI in a New Jersey court. The court granted an injunction barring the two carriers from connecting computer-generated calls to his 800 number.

However, Valenti claims that the calls continued.

The court later dismissed his case, claiming it did not have jurisdiction, and sent him to the FCC. Before filing the FCC complaint, Valenti said he was forced to close his business.

The FCC has 12 months in which to act on this complaint. □

## Users get new frame relay service

*continued from page 29*

firms with sites in the Northwest, Diginet has established a gateway with WilTel that will enable PakLink customers to communicate with sites served by WilTel's WilPak service.

PakLink supports port access speeds and committed information rates (CIR) ranging from 56K/64K to 1.024M bit/sec. Diginet said its network uses diverse routes between the Cascade switches.

PakLink's permanent virtual circuits accommodates bursts of up to 200% above the CIR, which is the minimum available bandwidth. Diginet said the length of the burst depends on the amount of available bandwidth in the net.

The carrier said it has already certified routers made by such vendors as Cisco Systems, Inc., Proteon, Inc., 3Com Corp. and Wellfleet Communications, Inc. for use with PakLink.

According to the company, PakLink supports integrated access, which means, for example, that users can employ a single T-1 pipe to access PakLink and other Diginet services, such as digital data service and fractional T-1. □



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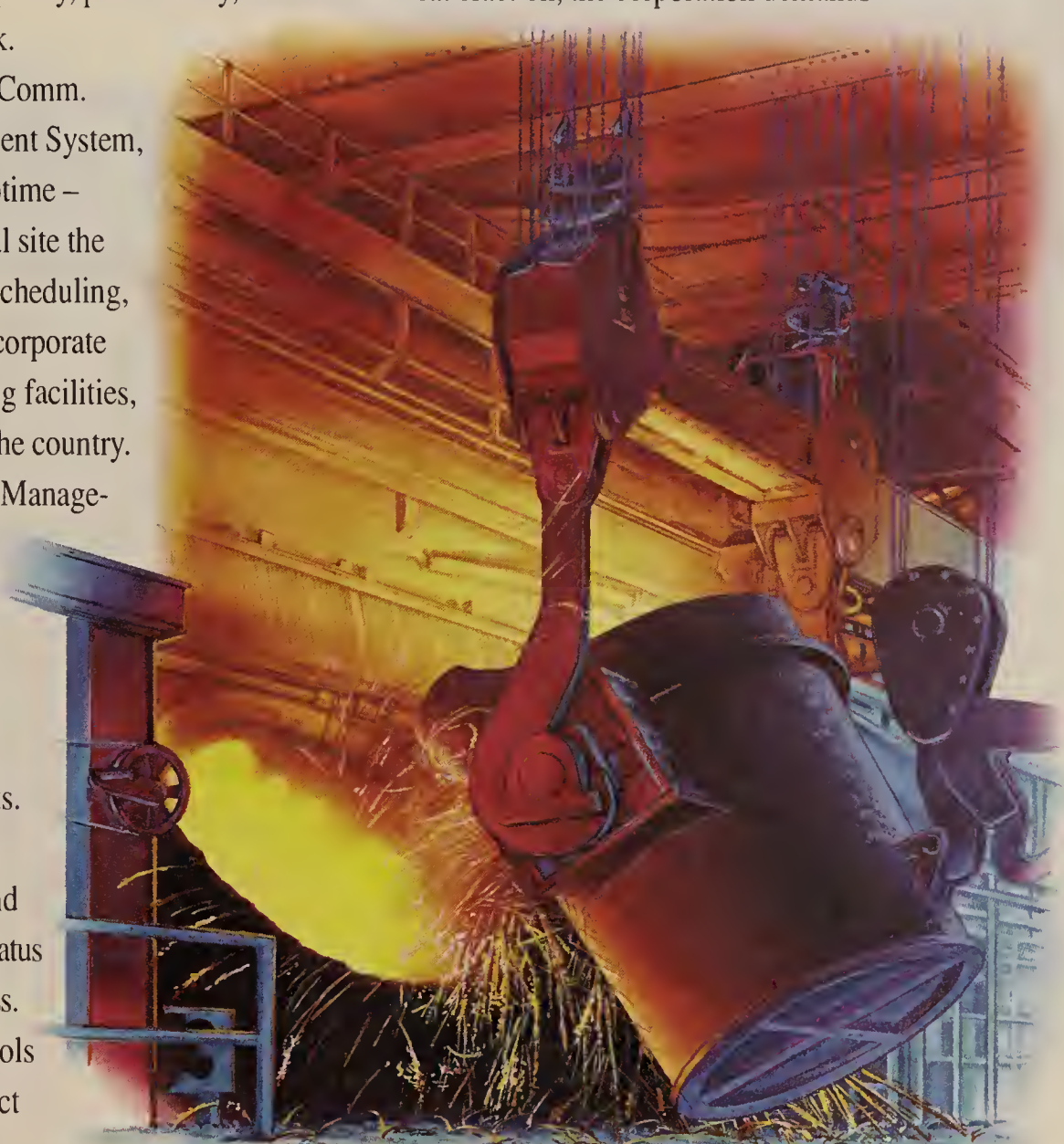
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Circle Reader Service #64



## Regulatory Update

continued from page 29

its petition. It said that in states that have allowed such competition, prices have gone down and telephone subscriber rates have held steady.

"Authorizing intra-LATA competition will promote freedom of choice for consumers, marketplace incentives for all firms, an increased variety of services and service providers, and lower cost-based toll rates," the carrier stated in the petition.

US West, Inc. last week asked U.S. District Court Judge Harold Greene for special permission to provide signaling services for its three smallest local access and transport areas from equipment located in remote LATAs.

The regional Bell holding companies are barred from carrying traffic across LATA boundaries by the Modified Final Judgment, and Greene has ruled that this prohibition includes signaling. US West said it needs a special waiver from this rule to ensure that it can serve all of its areas when 800 portability arrives.

In order to support 800 portability efficiently, local carriers must implement Signaling System 7 (SS7) to handle database queries regarding where to route 800 calls. Without SS7, the database query takes considerably longer to perform. US West said it wants the waiver so it can provide SS7 services to the three smallest LATAs, enabling them to support 800 portability until US West gets SS7 installed in those service areas.

US West Communications, Inc. announced last week that the second phase of

its Voice Interactive Program System trial has begun in Boise, Idaho. Customers participating in the six-month effort can sample voice-activated phone features on a pay-per-use basis.

If the results are favorable, the firm will likely seek approval from state regulators in each of the 14 states in its territory.

By dialing one code and speaking the name of the service, trial participants can use any of the features: Messages, Cancel Call Waiting, Return Call, Redial, Call Rejection and Call Forwarding.

"Last year we learned that customers liked the voice recognition system — 84% preferred it to the existing method of activating special features," said Joni Boulware, a project manager at US West Communications. "Customers said the primary benefit was not having to remember a lot of special access codes."

"This year, our objectives are to see how customers respond to the pay-per-use option and whether the system provides the right amount of information to help people who use the service occasionally," Boulware said.

The first trial, which ended in January, allowed participants to activate or deactivate services for which they currently subscribe. In the second phase, the 190 trial participants do not need to subscribe to the service in order to use them, with the exception of Messages.

For the services to which they do not subscribe, customers will be charged 50 cents per activation. The Call Rejection service also carries a charge of 10 cents each day the rejection list is active.

AT&T Bell Laboratories, the developer of the technology tested in the Boise trials, used customer feedback from the first trial to improve the system.

"We've made some improvements to the speech recognition," said Kevin Kinder, a member of Bell Labs' technical staff.

AT&T was reprimanded by the Federal Communications Commission last week for misleading statements it made to consumers in promoting a new calling card.

Beginning in 1991, AT&T issued new calling cards to its customers that could not be validated by any other carrier. Its earlier cards could be validated by all Bell company operators and most other long-distance carriers. With these new cards, if a customer dialed from a pay phone or other phone presubscribed to a service other than AT&T, the authenticity of the card could not be verified and the call was refused.

In its promotional literature, AT&T said the new cards were mandated "by government requirements." However, no such government order exists.

The FCC said AT&T's marketing campaign did not technically violate the Communications Act of 1934, but rather, its statements were misleading. "AT&T should have realized that members of the general public . . . could have been misled into destroying otherwise valid cards to their detriment as well as the detriment of other issuers of telephone credit cards that compete with AT&T in the market," the FCC said. The FCC said it expects AT&T to correct the misinformation it sent out previously. **E**

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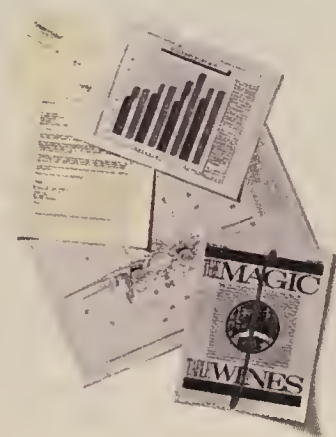
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## USER FORUM

BY JACK SOBISH

# Let's hear from users instead of consultants

Far too many consultants hawk their predictions of the future in public forums such as conferences and, yes, even on these Opinions pages. We simply need to hear from more users.

As a network analyst, I must look into my crystal ball and anticipate my firm's future networking needs. I must also separate fantasy from reality. Some of the rhetoric I hear and read from consultants is hard to swallow.

For example, when I attended a T-1 network conference in 1983, a consultant claimed that any T-1 nets that were incompatible with extended superframe format (ESF) by the following year would be obsolete. Well, nearly 10 years later, that prediction has not come close to fruition.

In the mid-1980s, the drum-beaters predicted that Integrated Services Digital Network would be the transport choice of the 1990s. However, early ISDN trials were not as successful as had been hoped, and it took years to develop an ISDN standard that everyone would adopt. As a result, ISDN support is still very limited.

A *Network World* column penned by Peter Davidson in February championed the estab-

lishment of a National Data Highway. He recommended that the federal government fund installation of a fiber backbone to support high-speed services. Drawing a parallel between the highway construction programs of the 1940s, he suggested putting idle communications professionals to work on this project. Understanding this concept is difficult. This is the same government that can't balance its checkbook. So should we give it responsibility for a highly technical data highway project?

This consultant missed the bigger picture. If industry or any other potential user needs this type of network, then simple economics of supply and demand will drive the investment of building one. In larger market areas, some users have demanded high-speed services, and the carriers have tariffed them.

A *Network World* column by Mary Johnston Turner in July suggested that videoconferencing will be affordable in 1993 and that by 1994, firms will line up at the door to use it. While the word "affordable" is relative, this opinion is old news. Low-cost switched digital services that support videoconferencing are already available, and many forward-thinking companies already consider videoconferencing a strategic tool for the 1990s.

I concede that some of these points can be argued like the rhetorical question, Which comes first, the chicken or the egg? Indeed, consultants must share their dreams if technologies are to grow and develop. But consultants should present their ideas with realism. Corporations have invested millions of dollars in their networks and are not about to dismantle them just because something new and improved comes along.

I am not advocating that consultants be banned from conferences or print. Whether fact or fiction, what consultants say forces users to examine their networking goals. However, more users should be sharing real-life ideas at conferences and in columns, instead of just letting columnists float balloons. ■

*Sobish is a network analyst at Dow Corning Corp. in Midland, Mich.*

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## EDITORIAL

# RBHCs have a lot at stake in TRIP '92

People keep talking about this week's TRIP '92 as a make-or-break event for Integrated Services Digital Network, but that's not the case.

ISDN's fate was sealed years ago by local carriers who moved too slowly and discordantly in offering the service. By now, ISDN could have been a mass-market offering supporting a growth industry in customer premises equipment and value-added services.

But it isn't. ISDN's reputation is tarnished and so is the image of the regional Bell holding companies as purveyors of advanced networking solutions.

Thus, the focus this week shouldn't be on ISDN, but on the RBHCs themselves, for which Transcontinental ISDN Project

'92 could be a watershed event. It could be the turning point at which the RBHCs begin to prove they are really serious about offering advanced services in a timely, wide-scale and cost-effective way.

Today, years after ISDN's heralded debut, the RBHCs still have extensive work ahead in upgrading their central offices to support ubiquitous ISDN services. Seamless availability of the service won't be a reality until National ISDN 1 is adopted across the board and the RBHCs finish a key underpinning of ISDN — end-to-end installation of Signaling System 7 facilities.

Now Switched Multimegabit Data Service and frame relay present the carriers with new opportunities. There is pent-up

demand for such services, but the RBHCs will have to hustle if they want to catch this wave.

The carriers have got to invest in product and marketing and make these new services available to users while the time is ripe — and with pricing designed to create demand.

If you offer the services, they will come and they will envision untold applications for the technology. If you delay, there will be plenty of alternatives developing.

As we roll into TRIP '92, the RBHCs need to remember that regulatory decisions aren't opening up the local loop to competition. The RBHCs themselves are because of their inability to meet customer needs in a timely fashion. ■



# OPINIONS

## CLIENT/SERVER COMPUTING

BY RICHARD FINKELSTEIN

# The problem with problem resolution in client/server



Building a client/server environment isn't easy and the situation gets much worse when hardware and software from multiple vendors are used.

Indeed, dealing with hundreds of vendors and products that don't work together in a heterogeneous environment is a constant source of frustration, especially when problems crop up. Because there are so many vendors and so many possible points of failure in a heterogeneous client/server environment, it is almost impossible to tell which one is responsible for causing a problem.

Furthermore, it is almost impossible to trace the root of a problem because client/server configurations are so unique, there is often no way to replicate a problem at a vendor support site.

Without replication, problems cannot be isolated quickly. Even if that is done, there are so many interacting hardware and software components from so many vendors that it is almost impossible to get the problem fixed.

Compare this to the monolithic worlds of mainframes and minicomputers. In these worlds, configurations can easily be replicated and technicians can gradually isolate and resolve problems. The hardware and software components of a minicomputer or mainframe system usually come from one vendor and are designed to work, be tested and evolve together.

Those who go back twenty or more years in this industry know that monolithic computers were not always fashionable. Back then, there were many more hardware vendors than there

are today, all seeking to intermix their hardware and software. The competition drove prices down and encouraged creativity. But there was a downside: When there was a problem and more than one vendor's equipment was involved, the finger-pointing game began.

Over time, organizations recognized the exorbitant support costs and risks associated with such heterogeneous environments. Mission-critical applications that had to be up and run-

**I**t is almost impossible to trace a problem because configurations are so unique.



ning within minutes or hours of a failure could not tolerate time-consuming finger-pointing. The solution was to limit the number of vendors.

Learning from the lessons of years ago, users must reconsider the pendulum's position in the client/server world. The swing toward mixing and matching multiple vendors' products minimizes up-front costs and allows users to choose best-of-breed products. But it has also created chronic integration and support problems. Minimizing the number of vendors in a client/server environment yields stability and predictability.

Clearly, users should standardize as much as possible on one hardware vendor that understands the need for continuity. The selected operating system should be directly supported by the hardware vendor, or there should at least be a close

alliance between the operating system and hardware vendors. This ensures that the hardware and operating system will evolve in unison.

It is also important that the network operating system (NOS) be designed and tested to work seamlessly with the client and server operating systems. It is common for Unix operating systems to support Transmission Control Protocol/Internet Protocol network services. Digital Equipment Corp.'s VMS supports DECnet.

Microsoft Corp.'s LAN Manager and IBM's LAN Server are designed to work on top of OS/2, while Microsoft Windows NT is being designed to support multiple NOSes. The upcoming UnixWare operating system, a joint effort of Novell, Inc. and Unix System Laboratories, Inc., will add Novell NetWare services to the core Unix operating system.

Selecting the hardware, operating system and NOS designed to work together makes it possible for the pendulum to swing from its current extreme of heterogeneity to a more moderate homogeneous world. In fact, I do not think there is any alternative.

This is not to say that an entire organization must start changing overnight. This is often not possible or even desirable. However, as organizations begin to migrate toward client/server, they should consider standardizing their client/server environments and gradually develop a framework that is maintainable and predictable. **■**

*Finkelstein is president of Performance Computing, Inc., a consulting company in Chicago that focuses on client/server and rightsizing applications.*

## TELETOONS

BY FRANK AND TROISE

### The Future of Networking Episode 25

June 11, 1996

The first motorcycle gang to use high-speed WAN technology hits the streets.



## LETTERS

### Muddling the facts?

There are some factual errors in a recent article by Tom Fermazin ("HDSL sends a clear signal to T-1," NW, Oct. 26), and they will most certainly confuse those attempting to learn about transmission.

The article states that load coils are added to the T-1 line. That is untrue. In reality, they are removed.

The article also states that transmit and receive pairs must be kept in separate binder groups. That was the original design goal. However, empirical evidence developed years ago allows for an unexpectedly high number of transmit and receive pairs to coexist in the same binder group. Consequently, it is much easier to "condition" a cable for T-carrier without employing binder group separation.

Knowledgeable transmis-

sion engineers and operations staffers have known for years that the original design criteria for T-1 on copper exchange cable pairs were too stringent.

Megalink or Hi-Cap lines have been rapidly installed where early design concepts would have precluded their use. When bipolar eight zero code substitution encoding is employed, clear-channel data transmission at 1.544M bit/sec is readily available on those copper exchange cable pairs.

The article also implies that high-bit digital subscriber line (HDSL) technology is the only method available to provide wideband service tens of thousand of feet from the serving central office. That is untrue.

One only has to use the digital loop carrier (DLC) equipment and multiplexers

(continued on page 78)

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# Reaping the rewards

By MARY MARTIN

Users at various stages of migrating to client/server nets are being rewarded by rapid development of flexible new applications.

**P**ioneering companies migrating from hulking mainframes to dainty personal computers and local-area networks say the rewards of client/server computing come from speedily developed, flexible new applications and happy end users.

Those who've begun the journey have wrestled with a variety of considerations, including cost, availability of applications, the skills of in-house programmers and the cultural shift from centralized to distributed control.

"I'm a diehard mainframe person," says Jim Vance, a systems analyst for White Castle System, Inc., a midwest restaurant chain. "I'm as surprised as anyone" to be leading a client/server charge.

Like others in his position, Vance says he's had to be completely reeducated in order to appreciate and implement client/server computing. He now believes the investment will more than pay off in faster application development, greater functionality and a reduction in mainframe expenses.

But if a user is intent on budget cutting or reluctant to cross relatively uncharted territory, client/server technology may not yet be worth the trip.

"If you can unplug the mainframe and cart it out the door, you'll save a lot of money, a huge amount of money," says James Herman, vice-president at Northeast Consulting Resources, Inc. in Boston. But for companies that cannot take that step, the savings of going to a client/server environment will be elusive.

In fact, research by Peter Schay at Gartner Group, Inc., a consulting firm in Stamford, Conn., indicates that companies investing in information technology for the first time stand to pay more for the equipment in a client/server configuration than for a terminal-to-host setup. However, companies with an existing inventory of Intel Corp. 80386- or 80486-based PCs will probably save with client/server.

"Very likely, it's not cheaper," says Edward Mulock, advanced technology consultant for Bristol-Myers Squibb Co. in New York. "But on the other hand, when you can do things better on client/server or do things that you can't do at all on the main-

*(continued on page 66)*



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## Also inside:

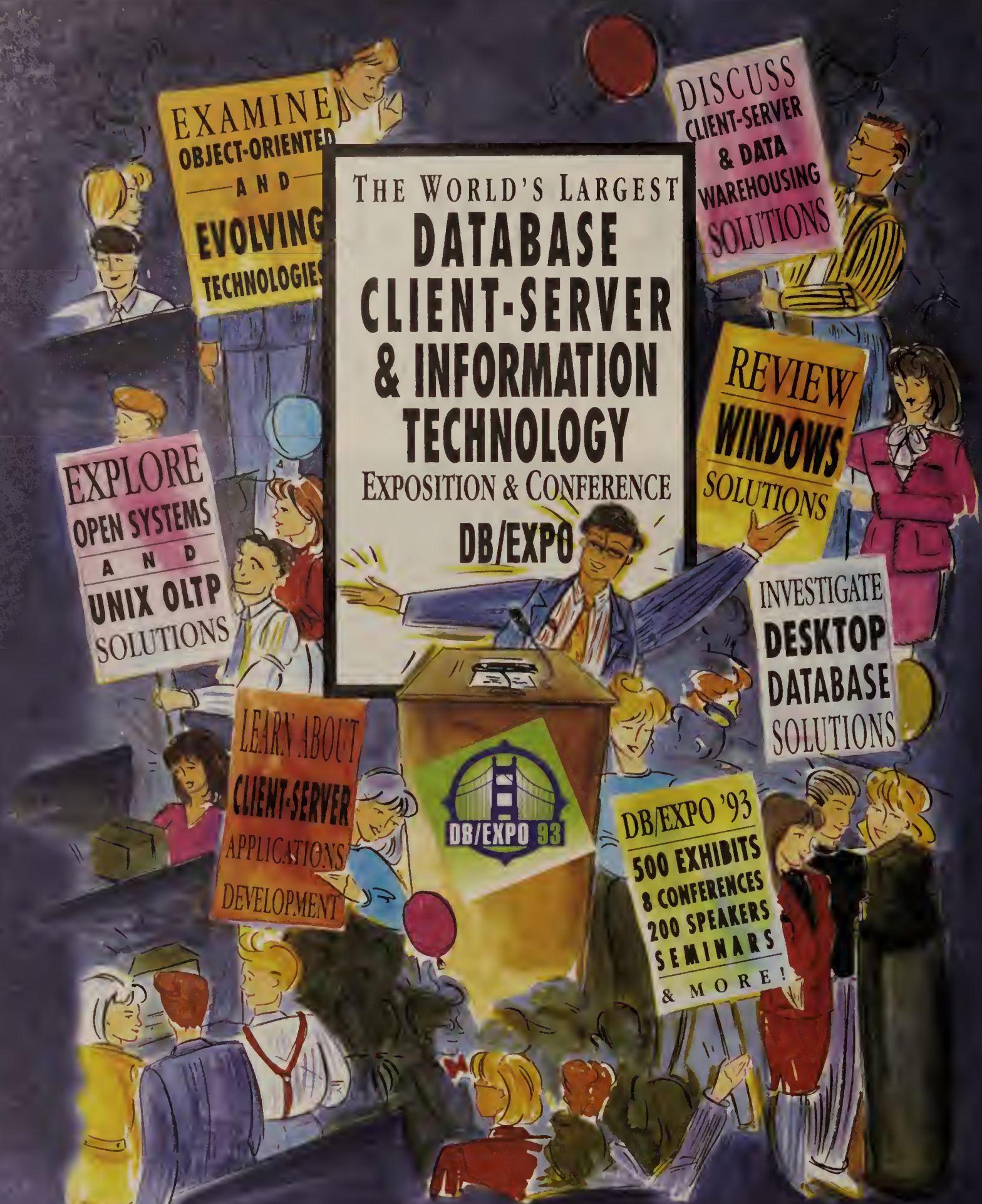


**Client/server guru speaks frankly on issues network managers may want to weigh before making the leap. Page 71.**



**Although in-house developers may grapple with client/server today, object-oriented programming and middleware will ease the strain. Page 75.**





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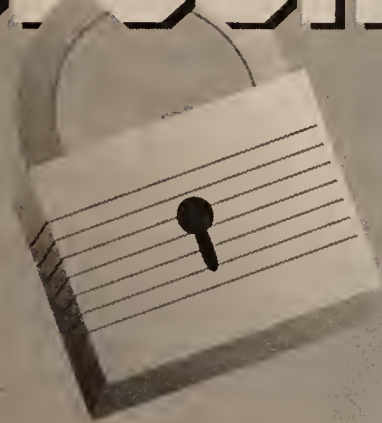
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(continued from page 63)  
frame, [cost is] not an issue."

Besides questionable cost savings, many other elements have slowed the client/server implementation.

Forrester Research, Inc. of Cambridge, Mass., was dismayed to find that its original projection for client/server growth was off by 75% in 1990. In a 1988 report, Forrester projected that users would be spending \$6.5 billion a year on client/server by 1990. In fact, users spent \$1.8 billion on the technology in 1990.

A shortage of programmers skilled in

network computing and a political conflict between "host-centric MIS and LAN-crazy renegade users" are major factors contributing to the underwhelming response to client/server, Forrester says. Others include an inadequate network superstructure, slow software development, complex application development and operating system confusion.

Richard Swanborg, senior manager at the Ernst & Young Center for Information Technology & Strategy in Boston, adds another concern — the potential for ending up with orphan products after some new

companies inevitably disappear.

Even so, those who've taken the plunge become committed converts, even surprising themselves. "Cautions aside, client/server presents some huge advantages, and anything's better than the mainframe stuff," says James Herman, vice-president at Northeast Consulting Resources, Inc. in Boston. "It's much easier to use, you get more flexibility, more functionality, and it will scale, if designed correctly, with the right architecture."

These are just the benefits Columbus, Ohio-based White Castle hopes to obtain

from its adoption of client/server technology. If all goes well, client/server applications will make management of some 9,000 White Castle employees at 270 sites in a dozen Midwestern states easier.

The restaurant chain's immediate goal is to have its first client/server application running at a regional office in Cincinnati later this month.

The application will help human resources staff maintain employee records. PCs in each restaurant within the Cincinnati region will gather employee time sheet data. A Hewlett-Packard Co. minicomputer in the Cincinnati office will dial up the PCs in each restaurant in the region daily to upload this information and make it available to users at minicomputer-attached terminals.

The minicomputer will also download the data to an IBM Personal System/2 Model 95 file server running Microsoft

“C  
lient/server  
presents some huge  
advantages,” James  
Herman says.

▲▲▲

Corp.'s LAN Manager and SQL Server database management system. Human resources staff at PCs running Windows-based client applications can supplement the time sheet data by tracking vacation time taken and insurance benefits used.

"This will be the first step toward building a WAN," Vance says. White Castle will roll out the application to any other regional office requesting it. It will eventually provide bridges or routers that enable the remote LANs to share data and access an IBM 4381 mainframe at company headquarters.

As a candidate for client/server computing, Vance describes White Castle's situation as a worst case scenario. The company currently uses the 4381 and local 3270 terminals to run such business applications as general ledger and payroll. Moving data from the minicomputers in regional offices to the mainframe requires a tedious manual batch process.

Currently, limited-function point-of-sale terminals in each restaurant track sales data that can be uploaded by the HP minicomputers in regional offices. Restaurant managers provide inventory and other operational data via written reports, which must be entered into the minicomputer manually. Each regional office produces a data tape that is shipped to headquarters and loaded into the mainframe.

The transition to client/server computing began a couple of years ago when the firm wanted to create an executive information system (EIS) that would provide upper management with easy access to sales and other historical data. The cost of purchasing a mainframe EIS was too high, and White Castle soon realized it made sense to take advantage of the power of the PCs strewn throughout its headquarters.

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A 3Com Corp. LAN was installed to enable the 60 to 70 PC users to share files and printers. White Castle then set out to build PC-based applications that mimic an EIS. That project evolved into the client/server environment currently under development, a course that Vance says he is certain is the right one for his company.

"We've gained much more flexibility, much more speed," Vance says. "I cannot think of any business environment where a client/server architecture would not be a benefit — from local retail to national chain, from service industry to government."

Furthermore, Vance says, White Castle expects to save a bundle by going to client/server but doesn't quite have a handle on how much. He believes the IS staff will not need to grow, even though more and better applications will be developed. Users will have new time-saving tools, and the company expects real savings because it won't have to upgrade the mainframe.

#### The search for tools

The biggest obstacle to making the client/server migration was finding the right database and development tools, a process that took White Castle nearly two years. But the result has been gratifying. Vance says a key in-

**"I cannot think of a business where client/server would not be a benefit."**



redient of their success so far has been the PowerBuilder object-oriented application development tool, made by Powersoft Corp. of Burlington, Mass.

With PowerBuilder, applications that would have taken two to three months to write for the mainframe can be written for the client/server environment in 15 to 20 minutes. The time savings is largely due to PowerBuilder's use of objects, which enables programmers to write certain routines once and use them in multiple applications.

The company's host-based CICS environment requires programmers to write entirely new

code for each application.

For other companies, the functional benefits of client/server computing are so indisputable that there is no need to justify the move with cost savings.

"If you pursue this with the idea that 'I'm going to cut costs,' you're going to walk away disap-

pointed," says Bart Greenwood, vice-president of network services at Norwest Corp. of Minneapolis. "If it's control and better management you're after or you're trying simply not to increase costs and add whiz-bang functionality, your expectations will be met."

Norwest, with banks in all 50 states, is about halfway through a two-year, \$20 million project to build a client/server architecture that will give personal bankers — customer service representatives assigned to watch out for the needs of the bank's largest customers — superior tools for generating business.

Eventually, tellers and mortgage bankers will also be brought on-line with a system that is intended to eliminate the error-prone process of memorizing codes and numbers currently used to access host data from attached terminals. The new system uses a Windows-based interface that has led to a "drastic elimination of errors," Greenwood says.

When the rollout is complete, some 10,000 IBM PS/2s will be attached to 16M bit/sec token-ring LANs in 350 branches. The PS/2s will operate on a client/server platform, using IBM's Systems Network Architecture to communicate with an IBM 3090 or Amdahl Corp. host in Minneapolis.

In large branches, the LAN will be attached via a Token-Ring Interface Coupler to an IBM 3745 front-end processor (FEP). Smaller branches will use Synchronous Data Link Control gateways that make the server operate as an IBM 3174 controller. The branch-based FEPs and servers will be linked via 56K bit/sec circuits to a host.

The PS/2-based servers and clients replaced an IBM 4700 financial system in which dumb terminals in each branch were connected to a controller that shipped data over a multidrop leased line to a host at 19.2K bit/sec.

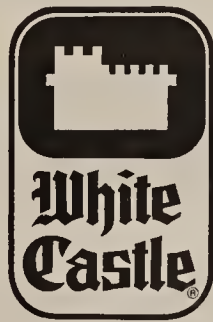
With the client/server system, bankers using Windows-based applications developed using soft-

ware from Argo Data Resources, Inc. of Dallas can sit down with customers and show them graphical representations that provide insight into financial decisions.

For example, a banker can easily access host-based data and paint the picture of savings and investment demands for a customer who wants help planning for a child's college fund.

Because Norwest began planning in the early stages of software product releases, there were few good tools available, making software customization unavoidable.

Norwest has also been making the transition in a "very, controlled fashion," Greenwood says. The bank tested the personal banker system at a pilot facility close to the operations center, "so that a 'SWAT team' of one to 100 people could be there fast, if necessary." That same facility will be used to test the teller and mortgage banker applications when they are developed.



#### Running with it

For other companies, cost avoidance and increased functionality were the driving forces behind the move to client/server.

When New York-based International Flavors and Fragrances, Inc. (IFF) began investigating an EIS to run on its IBM 3090 mainframe four years ago, it walked away from an outrageous price tag of about \$125,000. At the same time, the firm was installing LANs in many of its buildings and discovered it could achieve its goal using a client/server architecture for about \$60,000.

The difference was staggering, says Don Faistl, director of application development and technology services for the billion-dollar firm, which develops and sells the formulas needed to produce food flavoring and perfume fragrances.

At first, the company used Microsoft's Excel spreadsheet on PS/2-based clients and SQL Server on PS/2-based servers running Novell, Inc.'s NetWare. This setup enabled users to download and graphically display host-based data. When IFF started bumping up against the limits of Excel, it moved to Visual Basic, an application development environment for Microsoft Windows.

The move to client/server was made possible when IFF installed wiring for token-ring LANs at the same time it rewired buildings for

a new telephone system in 1988, Faistl says.

But cost avoidance alone hasn't driven IFF's migration to client/server. Unlike many companies that have investigated the client/server architecture on their way to downsizing, IFF is

leading-edge users, he says.

However, Faistl is quite happy with the decision to purchase PowerBuilder to complement Visual Basic.

"We tried to stay close to D&B's strategy," he says, noting that Dun & Bradstreet Software,

**"We want to streamline business practices," Faistl says.**



only interested in building client/server applications that improve their methods of doing business.

"We want a true business impact," Faistl says. "We're not interested in moving to client/server because it's less expensive than a mainframe. You can apply lower cost technology to inefficient business practices. We want to streamline business practices dramatically."

In the last few years, IFF has added several more client/server applications and about 250 users, with the potential to add another 300. For example, IFF developed an application that helps salespeople and new customers select and order a sample flavor or fragrance from a large pool of existing formulas.

Users on 80386-based PC clients have been enthusiastic about the ease of accessing information and applications. "I had a hard time convincing them that the data they were accessing was really in New York," Faistl



says of his users in Union Beach, N.J.

And with the goal of measuring and improving performance, users have shown a greater willingness to find ways to use and display information. LANs in a four-building IFF campus site in Union Beach are linked via fiber-optic cable. The campus

site is linked via a channel on a T-1 circuit to offices in New York and South Brunswick, N.J.

Eventually, IFF may need additional SQL Servers and more disk storage for the Novell file server. But first, Faistl says he needs better support from Microsoft. The Redmond, Wash.-based software giant supplies good products but has difficulty providing technical support to large

which supplies IFF's financial systems software, also utilizes PowerBuilder. Faistl says PowerBuilder works so well that he is trying to determine if it should become the firm's sole development tool.

"We have COBOL people who are now Windows/PowerBuilder people," Faistl says. "It was a relatively easy transition to learn PowerBuilder, but it was harder for CICS people to get used to the Windows environment."

IFF plans to continue taking advantage of the increased functionality available through the client/server platform. Applications to improve order processing are in the works, as are better links with customers and suppliers, possibly including electronic data interchange.

"I don't think there's a magic moment when you're done," Faistl says. "We're actively looking for opportunities."

#### The lowdown

New advocates of client/server technology agree that the advantages seem to outnumber the disadvantages.

There's no doubt that hiring systems developers or retraining COBOL programmers is part of the client/server commitment.

Searching for the right applications and development tools can be time-consuming. Figuring out how the new system will be configured and managed takes expertise that many firms don't have in-house. And ensuring that the net infrastructure is adequate enough to provide fast, reliable service can be challenging.

But client/server veterans say they are reaping unexpected rewards in productivity, new business tools and, for some, cost savings. Many are surprised to find themselves spreading the gospel of "Smaller is better," but they say it's only a matter of time before the masses are converted. **■**

*Martin is a free-lance writer based in the Boston area.*



Bart Greenwood






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## NetWare users uncover secret

*continued from page 1*

departments or branch offices have been burned by unscrupulous resellers.

"There's nothing stopping a dishonest reseller from installing a copy of NetWare, going to another customer and installing the same one, and charging both for the product," said Tom Thibault, president of Thibault Associates, Inc., a Novell Platinum dealer in Pleasantville, Calif.

"This is a significant concern to NetWare users," said Laura Swanton, president of NetWare Users International. "I think it's a widespread problem."

Cheryl Currid, president of Currid & Co., a network consultancy in Houston, agreed. "These things have happened pretty regularly over the years. [The resellers] think they'll never get caught because Network A is never going to be internetworked with Network B; Joe's Plumbing and Pool Supplies is probably never going to internetwork with Laura's Florist, so why not?"

### Fly by night

Unfortunately, when the problem is uncovered, the shady reseller is usually out of business and the user is left holding the bag.

That's just the problem encountered by a client of Steve Meyer, president of Avanti Technology, a NetWare consultancy in Austin, Texas.

The client, a major Italian bank that Meyer asked *Network World* not to name, decided to internetwork eight NetWare local-area networks. After months of hammering out the internetwork plan, the bank cut over the links only to have NetWare issue a message to every user on the net, including the chief executive officer, that an illegal copy of NetWare was installed.

That was the result of a NetWare security feature designed to discourage piracy. At regular intervals, each copy of NetWare broadcasts a Service Address Packet (SAP) to other servers on the net that contains serialization information.

In the bank's case, at least two servers had the same serial number, which kicked off the broadcast messages warning of an illegal copy of NetWare.

During an investigation, the bank learned that its systems integrator had installed legal copies of NetWare on four servers, but copies on the others. The integrator had cleverly partitioned the network so that none

of the copies would be internetworked with the originals.

The integrator had since gone out of business, and the network manager had to prove to Novell the bank paid for eight copies of NetWare, even though Novell's records showed the bank had only registered four.

"From Novell's perspective, you don't have a licensed copy," Meyer said. "Typically, they won't bring you up on charges if you cooperate with them, tell them where you got it and produce an invoice that shows you paid for it."

That wasn't easy for the bank. "The actual invoice just listed systems integration services," Meyer said. "They had to dig back and find the proposal [where the invoice was broken down into each component]. At that point, Novell was very cooperative."

Novell offered new copies for the pirated NetWares for the price of an upgrade, in return for depositions from the bank against the integrator. "Then Novell went after the integrator," Meyer said.

### Novell's view

When contacted about this article, Novell initially agreed to set up interviews with appropriate executives. Later, Novell declined to talk about the scope of the problem or how it deals with disreputable value-added resellers or users that have been caught in the situation, saying only, "We prefer to handle the matter internally."

For the most part, customers and others say Novell has been cooperative and has tried to help users that thought they were buying NetWare legally.

"I don't know if you can ever do enough [to stop this], but Novell is doing a very good job," Swanton said. "They're being very proactive."

Swanton, who is a support department manager at Hughes LAN Systems, Inc. in Mountain View, Calif., has first-hand experience with the problem, having run up against it at her previous company, which she declined to name.


There, Swanton undertook an inventory of the company's 11 LANs. "I was trying to locate my system operating diskettes, the ones Novell ships with the serial numbers on them," Swanton said. "I only came up with nine of the 11."

While searching, Swanton locked the nine diskettes in her office for safekeeping. Then, one of the firm's servers, located in another state, crashed and the consultant who had installed NetWare throughout the company came in to troubleshoot it.

"I had all the serial numbers with me in my office, so [the consultant] went ahead and used his own [copy of NetWare] just to get the machine up and running," Swanton said.

What happened next left Swanton uneasy.

rid said. "The last thing Novell should do is complicate their copy protection," she said. "Then they would make it hard for honest people [to work with the software]. It would be unwise for Novell to do anything ugly right now and tick off any of its



# NOVELL

## How to avoid being burned

### Steps users should take to ensure their copies of NetWare are valid:

- 1 **Insist on keeping the original diskettes and documentation on-site. At the very least, insist on keeping the original GEN.DATA or SERVER.EXE diskette on-site.**
- 2 **Make sure any new software arrives in unopened packages.**
- 3 **Make sure all new software is registered with the vendor.**
- 4 **Conduct a detailed examination of any value-added reseller to ensure its credibility and financial stability.**

GRAPHIC BY SUSAN J. CHAMPENY

"The serial number he used made NetWare's security kick in," she said. The SAPs showed the consultant's copy of NetWare had the same serial number as a copy of NetWare on another server in her company.

"He had been doing this, gosh knows how many times, and it bit him because he happened to be working in the same company where he had laid in the same serial number," she said.

Swanton went straight to her local Novell representative. "I had to protect myself, and I had to protect my company," she said.

Swanton said she doesn't know what Novell did with the information, but the consultant is still in business.

"In the interim, our company started shutting down offices," she said. "So we went legal anyway, simply by the fact that I took two file servers off-line before I left."

### Packaging problems

Some observers say the problem isn't unusual because of the way Novell packages NetWare. "Unfortunately, it's not that uncommon because it's not overly difficult to pirate their software," Meyer said.

"In the [NetWare] 386 and 286 arena," he said, "the only thing that's serialized is the SERVER.EXE program. On 2.15 or older, it was the GEN.DATA disk. But in all three versions, there's just one disk that needs to be registered."

But changing the way NetWare is packaged isn't the answer, Cur-

rid said, especially with the pressure they'll be under from Microsoft and Windows NT."

### Caveat emptor

So how can users protect themselves? There are some simple steps to take and some warning signs to watch for, according to users and analysts (see graphic, this page).

For example, Currid said that when she was working at Coca-Cola Foods in Houston, she thought that some of the company's licenses "were probably liv-

Users should also insist on keeping all the documentation and diskettes on-site.

"[A dishonest value-added reseller] will sell you a copy of Novell, but they'll say they need the books so they can support you when you call with problems," said Bill Strause, president of Stoney River Networks, a NetWare dealer in San Jose, Calif. "They keep the books, and they keep the diskettes."

That doesn't make sense because value-added resellers are required to have their own copies of the software and documentation.

At the very least, users should make sure they have a copy of the serialized diskette, either the SERVER.EXE or the GEN.DATA. "The diskette with the serial number on it — that's the big one," Thibault said. "It has to be the original with the printed label and the serial number on it. You're pretty safe if you have that diskette."

One very important caveat, one too often overlooked, is to ensure that the software is properly registered with Novell.

"Users should make sure they get a registration card and then register," Thibault said. "Don't take it and put it away. If they register, then they're protected. Even if they lose the diskette later on, it will be a very easy task to get a replacement disk."

But perhaps the best advice is to choose your value-added reseller wisely.

"Users should be careful, especially when dealing with a smaller [value-added reseller]," Meyer said. "For example, when you buy NetWare 286 100-user, the value-added reseller has to

Currid thought that some of the company's licenses "were probably living other lives."



ing other lives."

Coca-Cola installed all its own software, but when dealing with one reseller, the software would sometimes arrive in packages that were already opened. Currid believed the reseller may have been tampering with the software before delivering it to Coca-Cola, although she insisted on registering every diskette, ensuring that her company's copies were legal.

"When brand new software arrived in opened boxes, that was a sure sign," she said. Other users at the time were accusing the reseller of misappropriating software and the company has since gone out of business, according to Currid.

put out \$2,000 up-front, bill you and get his \$3,000 or whatever his margin is within 30 days. A lot of them get in cash binds and put out temporary copies. They intend to go back and update them, but never get around to it. And then, of course, there are probably a few that are just plain crooks."

Howard Lubert, president of HEL Software in Philadelphia, agrees. "In the last couple of years, there has been a huge influx of what I like to call profiteers, people in the business just for the money," he says. "Unfortunately, when people are in it just for the money, they'll do whatever they have to." ■



# Guru sheds light on client/server mysteries

**Q&A** Embracing client/server technology is no longer a consideration for many companies, it's a given.

However, network managers who have based their careers on legacy mainframe or minicomputer terminal-based networks may realize the need to move to client/server environments but may not know how to get there.

*Network World* invited Stan Levine, vice-president of technology with BSG Consulting, Inc. in Houston to answer some questions about how users can get started on the path to client/server networks. Levine has been developing client/server products and implementing them at user sites since 1985. He's consulted on client/server projects for such users as General Motors Corp., General Electric Co. and Mobil Oil Corp.

## How do you define client/server computing?

While [graphical user interfaces], SQL and downsizing usually come to mind most quickly in any discussion of client/server, these topics only scratch the surface of what can be done. Client/server technology is not limited to any particular class of application, but rather, it allows end users to reach programs and data wherever they exist in an enterprise — be it on mainframes, mid-range platforms or local-area network servers.

Client/server is also a new business model for the next generation of corporate [information systems] functions. In this model, end users are clients and the consumers, presenters and manipulators of information. IS personnel provide servers, which provide access to data, protects the integrity of that data and ensures that it is available to all those authorized to use it on demand.

## Does client/server require a user to downsize applications?

No. I find it slightly ironic that client/server is often considered the technology of downsizing when, in reality, it could equally be used to extend the useful life of existing mainframe technology. Client/server is truly the technology of rightsizing.

For example, Computer Associates International, Inc. has developed a server process that runs on mainframes and provides PC clients with access to its IMS database system. Using a Windows-based application called QbyX, or query-by-example, users can manipulate IMS information as if the data were stored somewhere on the LAN — which it now is, when you think about it. CA's technology turned the mainframe into a server that users can access directly.

While applications like CA's QbyX are still rare, the tools for building client/server bridges to and from mainframes are

becoming increasingly plentiful. In fact, in order to adjust to the new, distributed reality of corporate computing, many other mainframe software vendors are now adding client/server 'hooks' to their venerable systems to make them less foreboding to end users and networks.

## Where should users start to implement client/server applications?



## BSG's Stan Levine dismisses myths about networking in a client/server environment.

Perhaps to reach existing mainframes or to downsize applications to more cost-effective platforms. The technology can also be used to introduce entirely new capabilities to networks, such as imaging, real-time data and GUIs, without throwing out existing systems.

Rather than being the agent of revolutionary change, client/server technology can provide the evolutionary element that seems to be missing in an era of rapid change.

## Which applications should users migrate to client/server nets first?

There really is no one correct answer for the question, but there are some general rules of thumb to follow.

Creating new applications, for example, is often less traumatic than rewriting existing ones. Likewise, implementing so-called proof-of-concept applications — which use client/server technology to link different computing platforms, for instance — is a very common course of action that can reduce risk.

Aside from new applications, there are sound arguments that make several types of existing applications ripe for a move to client/server environments. Mainframe programs that, through years of modification, have grown unsupportable and unwieldy or run on outdated platforms that are unjustifiably expensive or risky to maintain, are ideal for a client/server shift.

migrate to client/server. For example, users may select target applications based on components of the application that are reusable, such as SQL database engines, DB2 gateways, document management systems or work flow software.

Once implemented, the strategic technology becomes a familiar basis for the development of new client/server applications. Another strategic method is to use as much off-the-shelf technology as possible to place imperfect but useful solutions into the hands of end users as soon as possible and evolve those applications into a client/server environment over time. This is known as evolutionary prototyping and is a favorite client/server technique used by systems integrators who want to secure early user buy-in of the technology.

## Are there some applications that should not be considered for client/server computing?

Because of current limitations in critical portions of networking technology, pure client/server platforms — such as some SQL database servers — are grossly inadequate for many applications. For example, client/server databases cannot yet handle thousands of simultaneous workstations for a given application the way mainframes can. Large numbers of geographically remote users pose an even more daunting challenge, while distributed databases or shared data, synchronized at multiple remote sites, do not really exist yet as a coherent technology.

## Which applications then are better suited for client/server nets?

Client/server environments are well-suited for applications where the emphasis is on user interaction with corporate information, such as decision support, statistical analysis, forecasting and other business support functions.

Client/server is also a very economical and reliable way to acquire data in real time, whether on the manufacturing floor or in a bank's automatic teller machine.

The need for interoperability is also a dead giveaway. If you need to integrate several off-the-shelf applications, mix and match application program interfaces, add graphical capabilities or share an application framework such as Windows 3.X, client/server is the likely choice because it ensures that a requester will gain access to the data it needs.

## How likely is failure in a client/server project?

If users are motivated, determined and inclined to read the manuals, it is unlikely that a client/server project will fail. For the most part, the technology works as advertised, although not without copious amounts of elbow grease.

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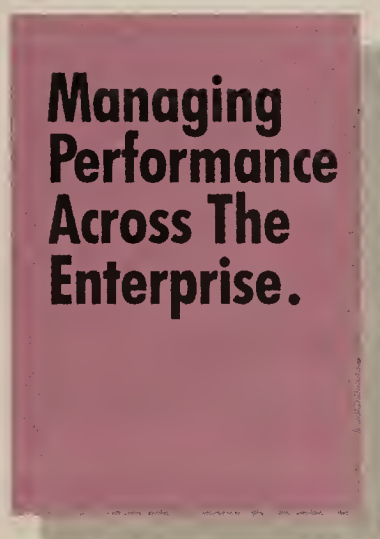
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LEGENT has licensed NaviGraph technology from Landmark Systems Corporation.



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The real hazards of a client/server project lie in its success. Users quickly take to the system and exercise all of its features. Other users join in, sometimes overwhelming the server, which then must be upgraded much earlier than anticipated.

Your ability to keep up with user demand, to support applications for your system that you had never dreamed of and to be exposed as a hero who can do anything thrown at you with literally no budget will be tested in a trial by fire.

**What issues should net managers weigh when considering client/server?**

“**H**azards of a client/server project lie in its success.”

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One very weak area is in verification, validation and control of application source code. The problem here is that most application development tools are targeted at individual end users who are not concerned with such requirements.

By contrast, corporate in-house developers work in teams, and current tool sets are designed for single users. The result is that in-house developers lack the full set of tools they need, such as configuration management tools. The good news is that this is improving rapidly.

Also, because of the reliance on technology from a wide variety of vendors, your specific configuration may not have been tried before.

In addition, software vendors typically sell to end users, not IS shops. As a result, basic functionality required by IS personnel, such as revision control, team development, embedded test libraries and data dictionaries, are only now making their appearance in the client/server world.

Training and experience can also be a major stumbling block. Since the technology is so new, there are few training courses in ‘distributed application development.’

Sure, companies like Oracle Corp. and Microsoft Corp. can provide excellent product-specific training, but there are few companies presently in the marketplace to help users make everything work together.

As a colleague of mine likes to point out, it’s just an issue of con-

necting the dots: Sybase 4.2, Windows 3.1, NetWare 4.0, AIX 3.2, etc. But where in the world does someone learn to do this?

There’s no doubt that COBOL programmers can learn to develop Windows applications or that users can employ remote procedure calls and object-oriented design. Client/server computing is not rocket science, at least not if you pursue a base of well-understood technology components.

The point is to adopt a base of client/server technology and expand on it incrementally. This will provide enough time for COBOL programmers and others to get up to speed, provided they have the correct tools.

In addition, people almost invariably rise to challenges — they often crave them.

And while many IS staffers have been insulated from the need to know underlying technology details, using high-level database subsystems, fourth-generation languages and reusable objects are certainly well within their scope. Innovations such as Windows NT will make server management and distributed computing all the more easy to master.

**Can client/server applications be built on existing LANs?**

Probably not. Most existing networks center around file-server software from Banyan Systems, Inc., Microsoft and Novell, Inc. File servers and the applications they support have been very forgiving of their networking environment, and even a poorly designed LAN can offer good service for most LAN users.

However, database servers and other client/server applications demand new, complex requirements, such as additional protocols like TCP/IP.

“**T**rainning and experience can be a stumbling block.”

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They assume there will be a robust and well-managed network to deliver on their promise and to prevent net managers from wasting their time separating application bugs from network problems.

So the first place to start is with your network. You need to iron out all the wrinkles and install network management software to detect and solve problems fast. ■

## Lessons from a seasoned downsizer

The stampede to downsizing has become the latest trend in the computer industry, with a herd of hardware vendors, analysts and MIS managers touting the benefits of trading mainframes for client/server systems. But for a few of us, this new trend is an old story.

Concord Group Insurance Co. moved to a combined mainframe/workstation environment in the mid-1980s. The company continues to run host-based sessions with its Unisys Corp. A Series mainframe, but the multitasking nature of 300 Unisys CTOS workstations enables those devices to run local applications, as well.

Since adding the workstations, we at the firm have never looked back. Some of the les-

**S**ince adding workstations, we have never looked back.

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sons we have learned are:

■ **Have a concrete reason to downsize.** More bang for the hardware buck is the usual reason given for downsizing. But the real question you should be asking is what downsizing can do for the people in your organization. Downsizing has the potential to improve people’s lives in the workplace — promoting teamwork and improving productivity.

■ **Don’t just port applications, improve them.** Too many MIS managers think of downsizing in terms of blindly moving their mainframe application over to the client/server network. Instead, they should rethink their application strategy to take full advantage of the new environment.

For example, when personnel used mainframe applications to fill out on-screen forms, they could send the data from the terminal only in a single-block transmission after the full-screen input was completed. If they made a mistake, the program wouldn’t catch it until the TRANSMIT key was finally hit. The delayed feedback resulted in lots of wasted effort.

The new network environment gave us the opportunity to

rethink the process. Using Progress Software Corp.’s fourth-generation language, we developed an application called Action+Plus that provides instant feedback throughout the data entry process.

It performs validity checks on the dates, ages, and license and registration numbers as a clerk enters the data, instead of minutes later. This has resulted in a dramatic increase in productivity and has made data entry less frustrating.

■ **Think about application portability during development, not just during deployment.** When we began writing Action+Plus, Progress Software’s fourth-generation language was unavailable on CTOS systems. But we were able to begin the project with DOS and then move it to CTOS later — all without missing a beat. We later tested the finished application on a DOS personal computer and a Sun Microsystems, Inc. Unix workstation. It ran perfectly in both environments.

■ **Harness the power of multiple processors.** Client/server systems may look small compared to the mainframe, but working as a team, they can carry large loads. For example, in our Action+Plus design, we created a distributed system in which tasks can be sent to idle workstations with a single keystroke.

That has been especially useful for agents who must churn out a succession of lengthy business reports at the end of each month. For example, one of our agents completes his month-end process using 14 networked machines, which all process different reports simultaneously with-

**A** good strategy is to build the client/server system around the mainframe.

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out user intervention. When a given workstation completes the processing of one report, it can immediately pick up another, enabling the agent to close an accounting period in just a few hours.

Hence, this approach represents an easy way to use the power of parallel processing.

■ **Don’t eliminate the mainframe — surround it.** As smaller systems loom larger in



Dirk Faegre

the planning process, the mainframe is sometimes forgotten. A better strategy is to build the client/server system around the mainframe — fitting the most appropriate task to the most appropriate platform.

For example, our Unisys A-10 mainframe is connected to the motor vehicle departments of New Hampshire, Maine and Vermont, enabling any agent at any office to run a motor vehicle check on an individual.

Whereas other insurers send computer tapes back and forth and wait as long as several weeks to verify license records, we get the information in about 15 seconds. This immediate response means our agents don’t waste resources trying to sell insurance to someone with a suspended license, or worse, providing insurance coverage to an undesirable individual.

Currently, we believe the mainframe is still the best solution for our widely scattered agents. I am not aware of any Unix servers capable of supporting 1,500 clients as gracefully as the A-10 does.

■ **Think of downsizing as a productivity improver.** Managers at the most successful installation sites view downsizing as an ongoing process. They are constantly developing new applications and adding more workstations.

We have found that people are at first reluctant to give up their familiar terminal-to-mainframe connection. But when they see what is possible in a client/server environment, they invariably want more of the same. So we plan to continue with other downsizing projects.

*Faegre is a network administrator with Concord Group Insurance in Concord, N.H.*



# The evolution of the client/server revolution

**B**uilding homegrown distributed applications for today's legions of local-area networks is no piece of cake.

Developers must contend with interfaces to specific network operating systems (NOS) that restrict applications to a single network environment. If the decision is made to make a program available to other NOS users, developers often must rewrite a good portion of the code.

But in the not-too-distant future, emerging technologies, such as middleware and object-oriented programming, will significantly ease client/server applications development and portability of programs among different net environments.

Although these technologies will be a boon to applications developers, the resulting proliferation of networked applications will come with a large burden for network managers. Managing the dynamic topology of application servers, monitoring and improving client response times to remote services, and keeping the network secure will be major issues in the years to come.

## The here and now

Although many companies are already implementing client/server applications, the tools and processes associated with this technology are still in their infancy.

The shortage of mature client/server software tools has made application development cycles longer than necessary. Furthermore, software developed with existing tools are not readily reusable. These

problems have forced early adopters to focus on meeting a specific need in their organizations. Client and server software components are tightly coupled and are typically built by the same team. The applications solve short-term company needs but are difficult to reconfigure when the company must change platforms or networks, or when business requirements change.

Although these technologies will be a boon to applications developers, the resulting proliferation of networked applications will come with a large burden for network managers. Managing the dynamic topology of application servers, monitoring and improving client response times to remote services, and keeping the network secure will be major issues in the years to come.

With current client/server applications, the location of servers that a client needs is generally limited to a single LAN, where the client requests data from a local server. In the future, client applications will access data and applications located on multiple interconnected LANs throughout the organization.

Today, specific clients and servers are strongly coupled together, resulting in fairly predictable network traffic. Because most client/server applications are database applications, today's network manager manages file servers and DBMSs that run on servers. In the future, net managers will also be responsible for overseeing name services that help client applications locate server applications anywhere across an enterprise network and redirect requests to those nodes.

Electronic mail, Lotus Development Corp.'s Notes and custom database applications are the main distributed applications in use today. Each application has its own management needs. For example, Notes requires the network manager to administer access control lists (ACL). These ACLs restrict user access to servers and databases and limit the level of access, such as read or write access.

As new distributed applications are added to the network, each with its own simi-



Middleware and object orientation promise to redefine client/server application development; net managers face slew of new issues.

lar but nonintegrated management needs, the network manager's job becomes increasingly complex. For instance, because there is no standard approach to security, each network application is forced to provide its own mechanism. The result? The network manager is saddled with the chore of maintaining multiple customized security domains.

## What the future will bring

Today, developers write applications that are tightly coupled to a specific client and server. In the future, distributed application developers will produce client and server applications independent of each other.

Server applications installed on a network will register as reusable corporate services in a name service or directory service. Client application developers, including end users applying fourth-generation languages, will write code that accesses these services.

The relationship between clients and servers will be much more dynamic. The network managers may add new clients and servers and remove existing servers or move to new platforms without impacting client programs.

Users will access a variety of servers and have the ability to change their usage

of corporate services at any time. They will come to expect and demand the flexibility to customize their environments to include preferred network services.

The next generation of environments and tools for distributed application development, which will be based on middleware and object-oriented technology, promises to make this future a reality. These new tools will simplify and speed development of higher quality network applications that are portable and reusable.

Vendors have just started shipping these new development products during the past year and many more will be available during the next twelve months. Users and network managers will see applications based on these products shortly.

The basic technology supporting this next generation of client/server development tools is middleware. In-house application development staffs and software vendors can use middleware to ease development of network applications. Middleware is an emerging category of software that works as an intermediary between applications and the underlying operating system and services ("Middleware: networking's postal service," *NW*, Sept. 7).

With middleware, developers no longer need to focus on platform-specific issues. Instead, an application developed using a

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By ALAN EWALD and MARK ROY



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middleware application program interface (API) can easily move to any platform the middleware product supports.

Client/server applications developers can benefit from middleware because it will make NOSes transparent to the development process. Instead of writing an application to a specific NOS API, developers link their code to a common set of communications services within the middleware, which then handles routing of application calls to the appropriate server or node. The middleware products reside in both the client and server portions of an application.

One of the most widely recognized examples of middleware is the Open Software Foundation, Inc.'s (OSF) Distributed Computing Environment (DCE). The DCE is a set of services, such as remote procedure call, name service and security, for development and deployment of distributed applications and products. Many vendors have announced or already have available implementations of the DCE.

#### Objects loom as factor

In addition to middleware, object-oriented programming techniques will have a



major impact on the future of client/server application development.

The Object Management Group's Object Request Broker (ORB) will likely emerge as a pivotal technology for developing client/server applications. The ORB provides the means for client and server objects to make requests and receive responses. A client requests a service through the ORB, which locates a server, passes the request to the server and returns a response to the client.

The ORB takes middleware to a higher level than the OSF's DCE and other products by defining an object-oriented model for distributed applications. Object technology is an approach to software development that allows the developer to define an entity from a given domain and assign related attributes and behavior to it. For example, if you build a system for power plant monitoring, then you would define objects that represent equipment such as sensors or consoles. Data and the processes related to the data are combined into objects.

Adding object technology to middleware simplifies development and makes the resulting applications easier to maintain and reuse. By keeping all the details of an object in one place (and distinct from other objects), developers can add new features to the object and make improvements without adversely affecting an en-

tire system. Pieces of applications are more reusable as objects because they are no longer tied to a specific application. Since a properly designed set of objects is independent, it can easily be reused in multiple applications.

Digital Equipment Corp. and HyperDesk Corp. both have ORB implementations available today, and several other vendors have announced plans for ORB-based products. Developers can also choose other object-oriented client/server middleware products that aren't ORB implementations, such as Symiotics,

Inc.'s Networks! Developer and NCR Corp.'s Cooperation.

#### Issues for net managers

Greater dependence on client/server applications will result in increased network traffic and management concerns. Although developers and users stand to gain significant benefits from client/server middleware and the applications built using it, network managers confront a new set of challenges.

One of the biggest concerns for network managers in the face of a multitude of

client/server applications is security. As distributed applications become more prevalent, security requirements become more critical. Users from many different nodes may access a particular server. In addition, if a client program requests use of a service, a remote server can automatically start a new server program to provide that service for the client. Each of these operations will need to be performed in a secure manner.

Technologies such as the OSF's DCE provide security services and will help ease the management burden. However, only a





fraction of future networked applications will be built on the DCE and it will be several years before the DCE figures prominently in the plans of many Fortune 500 companies. Overall network security will continue to be a major concern for network managers.

Users and network managers need to push application and middleware vendors to deliver products and tools that share common, standard security mechanisms.

In the client/server middleware environment, application servers will dynamically register their location using a name

service. Client applications will find network services by directly or indirectly accessing this name service. It will be a vital component of the distributed computing environment and must be highly available.

The network manager will have to ensure the fast performance and continuous availability of the name service and can expect many clients to access it. To ensure availability, it may be necessary to run the name service across several servers, so if one server goes down, clients will still be able to access the service. Or clients could read the information in the name service

once and then store that information locally, updating it on a regular basis.

As the server location becomes dynamic and transparent to the end user, troubleshooting will become more difficult. Users will be unaware of exactly which servers they are accessing and where they are located. Therefore, users that encounter problems won't be able to tell the network manager specifically which server is unavailable.

It will be increasingly important for network managers to consider load balancing of server applications across ma-

chines. Initial implementations of client/server middleware do not automatically split requests across multiple equivalent servers.

To maximize response time and use of server resources for multiple clients, network managers must control the number of applications started on each server and may need to replicate servers or move the applications to larger machines to handle more requests. Network managers may need tools to monitor the flow of requests and recommend ways to improve performance.

Existing network management protocols don't solve the problem of managing the new generation of distributed applications. The OSF's Distributed Management Environment (DME) promises to provide a consistent approach to network management. But because the DME is not yet available and because it will take a while to deploy DME implementations universally once they start shipping, it will be years be-

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**T**he distribution of data to file servers through SQL access is dominant today, but the tools are now here to enable users to implement true distributed computing.

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▲▲▲

fore user companies get the full benefits of DME products.

Moreover, the DME does little to solve the problem of managing the distributed applications themselves. Until next-generation tools are readily available, the job of managing this environment will be difficult.

The distribution of data to file servers through SQL access is dominant today, but the tools are now here to enable users to implement true distributed computing.

Using client/server middleware tools and object-oriented programming techniques, developers can now deliver network-available components, enabling a building-block approach to distributed application development. Developers and integrators will deploy many more distributed applications in the future. Network managers must prepare to put up with these burgeoning distributed applications until application management tools become available. ■

*Ewald and Roy are cofounders of NetLinks Technology, Inc., a Nashua, N.H., consultancy that specializes in distributed object computing and application integration. They can be contacted at (603) 891-4177 or on the Internet at 75020.3234@CompuServe.com.*



## Sprint discounts 800 as portability nears

*continued from page 2*

and free or cut-rate management reporting packages.

"We're targeting call centers that spend up to \$100,000 a month on 800 service," said Gery Euston, Sprint's vice-president of business product marketing.

The package is available to new and existing users.

Sprint's announcement comes just one week after National Westminster Bancorp

signed an agreement to move its prized (800) NAT-WEST number and millions of dollars of traffic from AT&T to MCI as soon as portability is available.

Today, 800 numbers are assigned to specific carriers. With portability, database technology implemented by local carriers will enable customers to use an 800 number with any carrier.

According to Sprint, it is hoping Clarity Call Center will lure users away from other carriers. It includes discounted rates for after-hours business calling that are as much as 35% below daytime rates. "Our

research found that companies with call centers for telemarketing and order-entry applications [place and receive] the most calls after normal hours," Euston said.

Sprint has also eliminated the onetime \$500 installation fee per site for DNIS, which helps users with multiple 800 numbers quickly and efficiently route incoming calls to a specific site or agent group for processing.

The carrier has established a discount of up to 20% for its so-called real-time ANI feature, which delivers the calling party's number to the call center on the same

channel that carries the call. That is cheaper than Integrated Services Digital Network ANI, which often requires a switch upgrade and a Primary Rate Interface line.

Sprint Clarity Call Center also includes enhanced 800 routing, which enables a user to route calls to specific sites based on the time of the day, day of the week and day of the year. The net can also route incoming 800 calls based on area code or area code and exchange. Firms can also designate the percentage of calls they would like routed to each site.

The carrier considered charging users a onetime installation fee for integrated access to Sprint Clarity Call Center but decided against it. Integrated access enables users to employ a single link to handle incoming and outgoing calls.

Users can also receive the Call Center Telemanagement Report Package, a subset of Sprint's hard-copy 800-call reports for call center managers. The reports cost \$10 each and include information such as a list of callers that were unable to reach an agent and how many times users tried an 800 number before quitting.

In addition, the carrier will give rebates for use of FONView, its IBM personal computer-based invoice and reporting system. Firms that buy Clarity on a monthly basis will receive a \$50 rebate after six months; those that use the service for six months and then sign up for a term plan will receive a \$100 rebate.

With Sprint Clarity Call Center, users can combine usage from all of their locations for all 800 and outbound, domestic and international calling in order to receive volume discounts. **□**

## Letters

*continued from page 59*

that already exist in most suburban areas. Virtually any service available next to the serving central office is available scores of kilofeet into the suburban or rural area.

DLC systems, fed by either copper or fiber, have been proliferating for over a decade. Extending clear-channel service beyond the DLC remains relatively inexpensive, with minor modifications to equipment and cable already in place.

Edwin Moelder  
Independent communication  
engineer  
EM Electronics  
Columbia, Tenn.

*Author's response: Indeed, load coils must be removed when installing T-1 circuits. Thanks for catching that error.*

*As for binder groups, sources at Bell Communications Research and Wisconsin Bell, Inc. say binder group separation is normal operating procedure when installing T-1 circuits.*

*We never intended to imply that HDSL was the only method of providing wideband service tens of kilofeet from the serving central office. Where fiber or DLC equipment is in place, that would be the logical means of providing high-bandwidth service.*

*However, when neither fiber nor DLC is available, HDSL provides an economical alternative to T-1 over existing facilities. **□***

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## Consortium to shape fate of AppleTalk

*continued from page 1*

Cisco Systems, Inc., Farallon Computing, Inc., Shiva Corp., 3Com Corp. and Wellfleet Communications, Inc. The forum, which has yet to be named, will combine efforts that Apple and individual router vendors have undertaken separately, leading to a more open and interoperable AppleTalk standard.

A team of four vendors — Cayman, Cisco, Shiva and Wellfleet — had planned to propose a specification to the Internet Engineering Task Force this week that aims to improve one key aspect of the protocol. Dubbed Dr. Pepper, the specification calls for Transmission Control Protocol/Internet Protocol encapsulation to improve routing of AppleTalk packets across wide-area links.

But according to Paul Gustafson, product-line manager at Shiva, the vendors shifted tack after Apple expressed interest in working with the group in a public forum — a radical departure from the Cupertino, Calif.-based vendor's customary closed-door approach to developing the protocol.

"Dr. Pepper was originally intended as a tactical solution, but having Apple willing to participate as an equal party is much better for vendors and users from a strategic, long-term outlook," Gustafson said. "Now we'll be able to address not just tunneling, but a whole range of AppleTalk issues that will bring [the protocol] real scalability."

### One body, one mind

According to Garry Hornbuckle, network evangelist at Apple, the primary goal of the new forum will be to create a single body to develop AppleTalk specifications that are more open to third-party developers.

"Our goal is to make this a broad and open platform for all interested parties to discuss how we can enhance the routing of AppleTalk," he said. "Our users are asking us for no less."

Mike Bailey, a systems integrator at Lockheed Missiles and Space Company, Inc. in Sunnyvale, Calif., applauded the vendor cooperation in working to make AppleTalk fit more snugly into corporate nets. Although AppleTalk functions beautifully in small departmental work groups, Bailey said its capabilities quickly dissipate when large numbers of Macintosh work groups are networked.

"Apple has not paid enough attention to the networking requirements of large Macintosh users because the protocol simply breaks down when you start networking on an enterprisewide basis," he said.

"I don't want to see the vendors fighting with one another to come up with an acceptable protocol to meet my needs," he added. "That leaves me out in the cold. I'd love to see them working together to come up with solutions — and soon — that I can use on my wide-scale internet."

According to Lippis, AppleTalk is among the top four network protocols in use today. As its use has grown, so has the need to boost its capabilities in multiprotocol nets.

One of the main deficiencies of AppleTalk today is the Routing Table Maintenance Protocol (RTMP), a transport-layer

protocol that creates and maintains the information required to route packets from a source to a destination. With RTMP, routers swap AppleTalk databases every 10 seconds, consuming excessive bandwidth and creating frequent logjams on the wide-area net.

### The AURP solution

Apple has proposed its own method to supplant RTMP, called the Apple Update Routing Protocol (AURP), that sends updates every 30 seconds, instead of RTMP's 10-second interval. AURP also supports

AppleTalk encapsulation in TCP/IP, eliminating some of the intensive upkeep associated with multiprotocol nets.

The Dr. Pepper specification closely mirrors AURP in that it also encapsulates AppleTalk in TCP/IP. Dr. Pepper is expected to be available by the end of the year, and implementations could be available as early as the first quarter of next year.

But TCP/IP encapsulation is only part of the solution. The forum will work to advance Apple's AURP specification, which aims to resolve a broader scope of AppleTalk issues. One official said Dr. Pepper it-

self may eventually be merged into AURP.

According to a forum member, who asked not to be named, the group will investigate the development of a link state protocol like the Open Shortest Path First or Intermediate System to Intermediate System protocols for AppleTalk to provide better traffic distribution and improved response to failed links.

In addition, the 30-second updates of distance vector protocols such as AURP and Dr. Pepper would not free up wide-area bandwidth as much as a link-state protocol could. **■**

# Focus On Token Ring

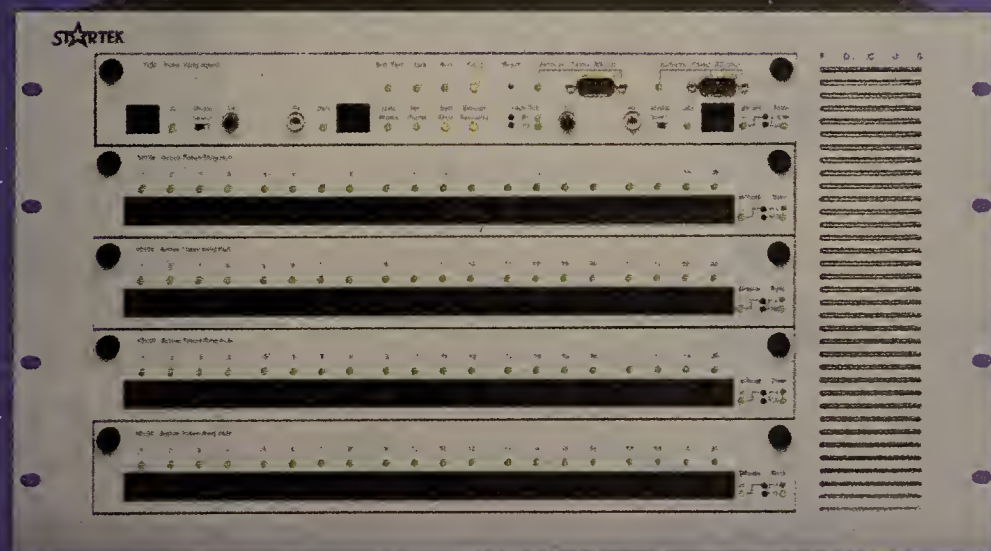
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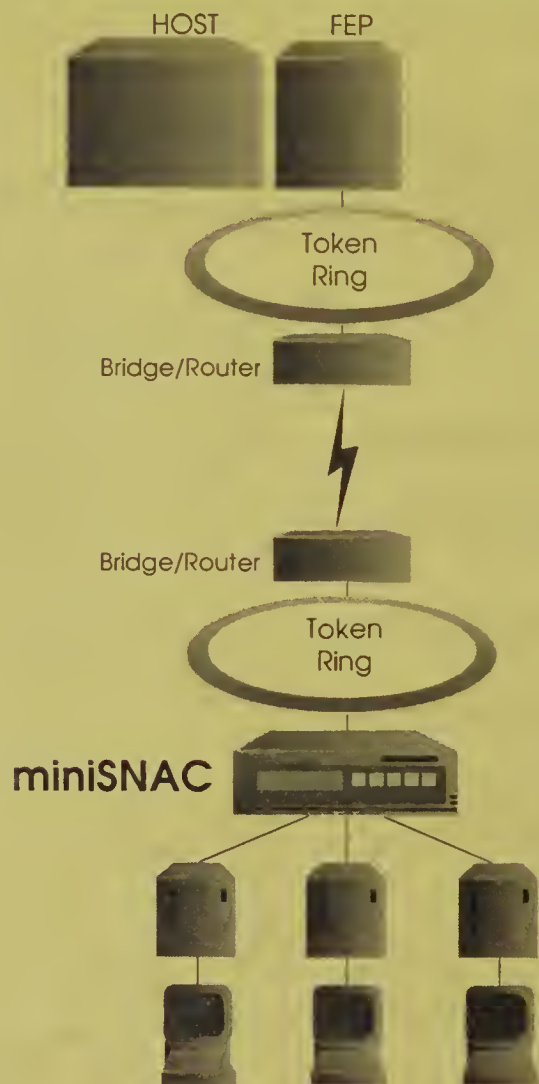
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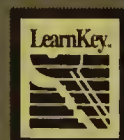
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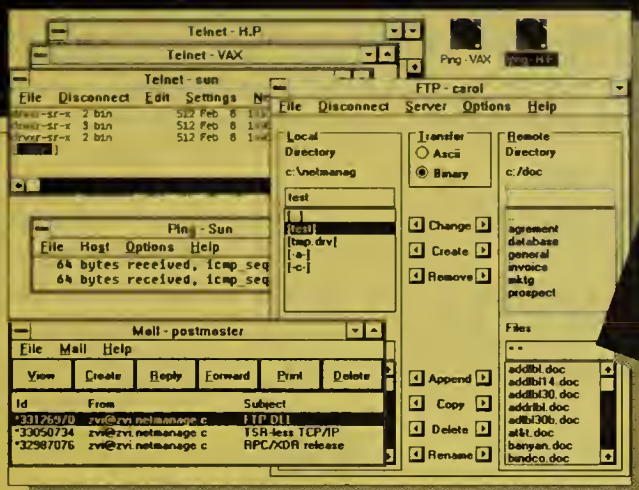
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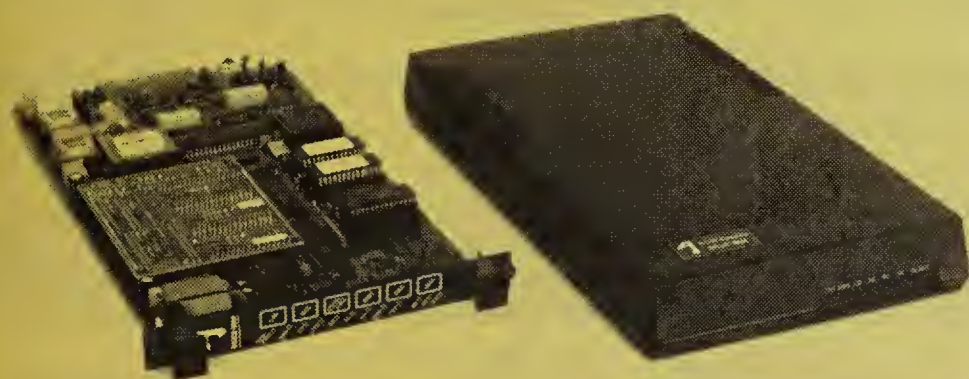
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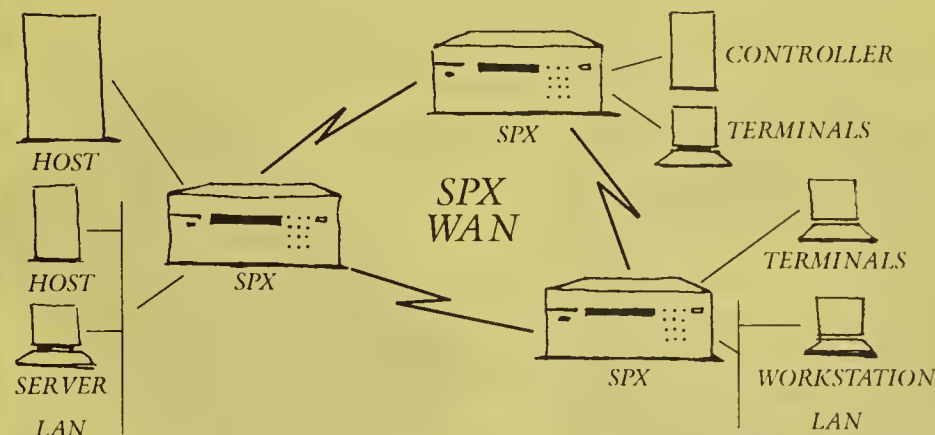
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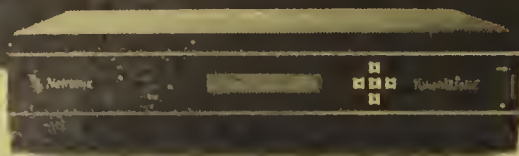
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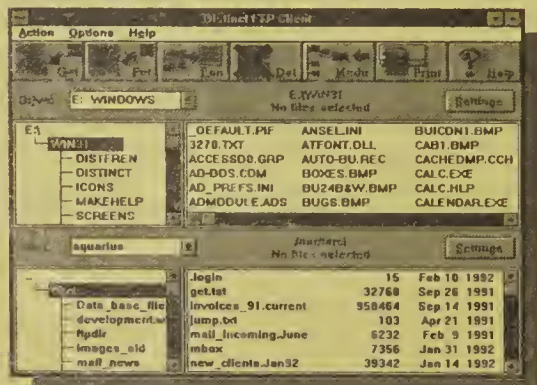
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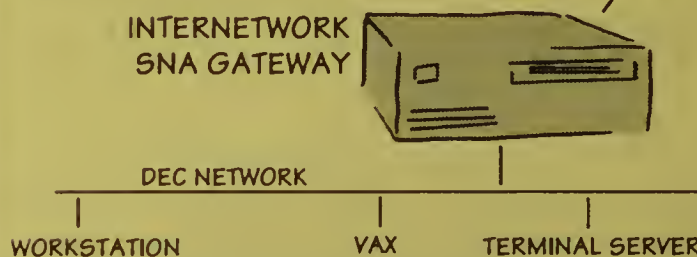
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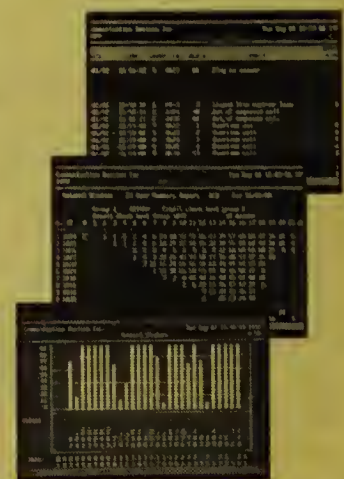
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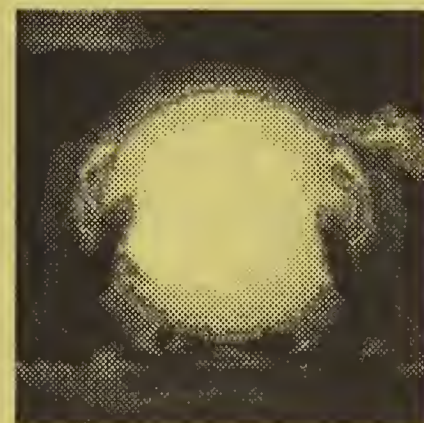
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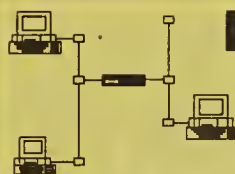
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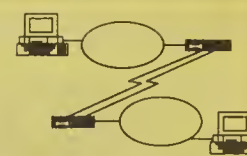
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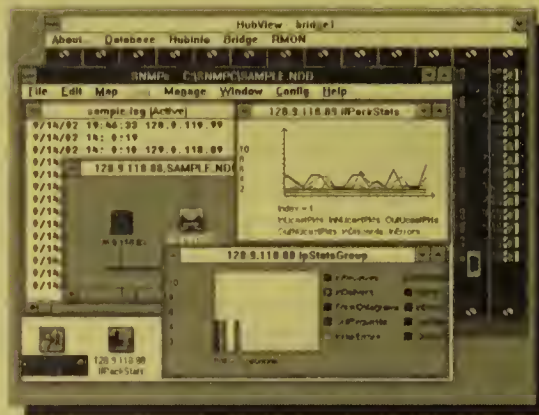
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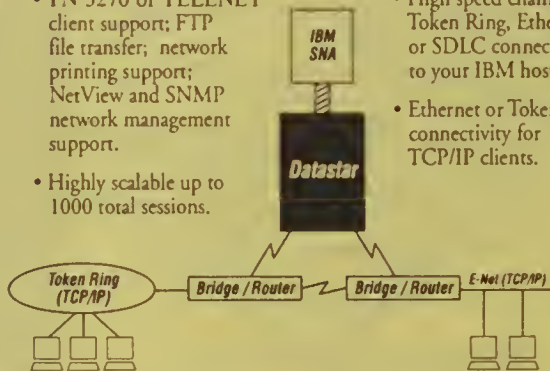
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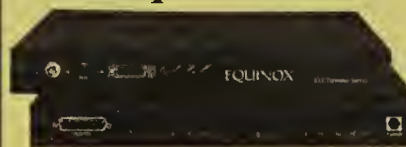
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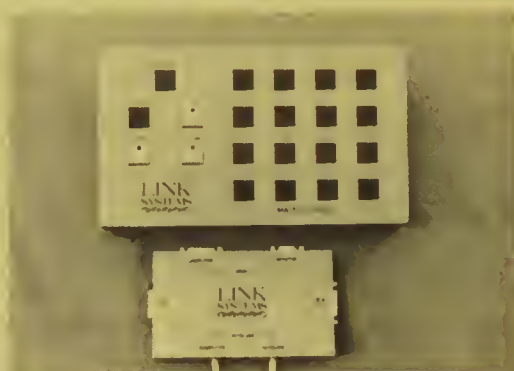
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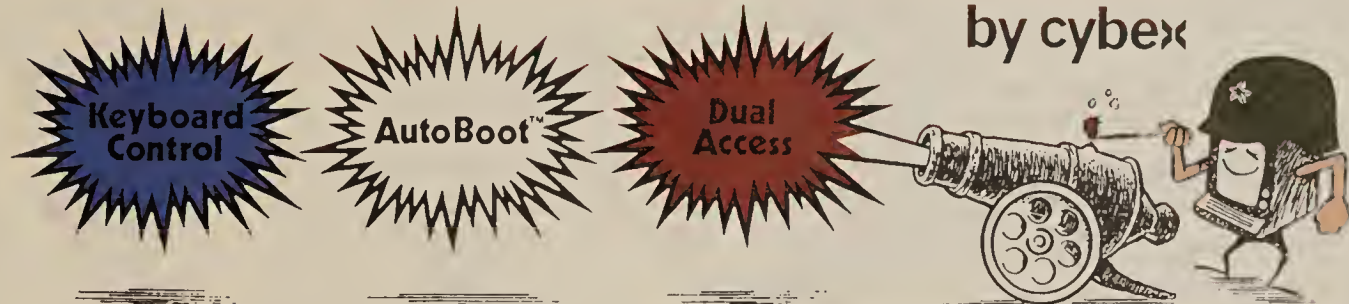
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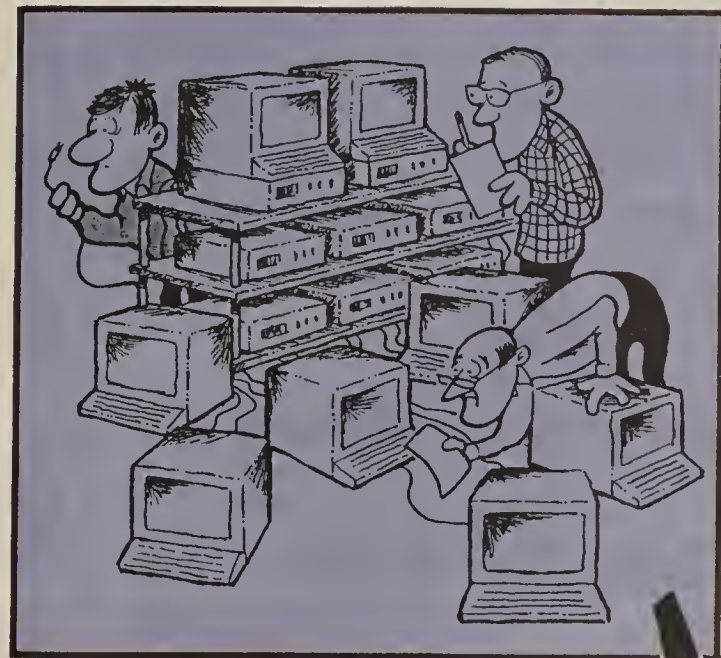
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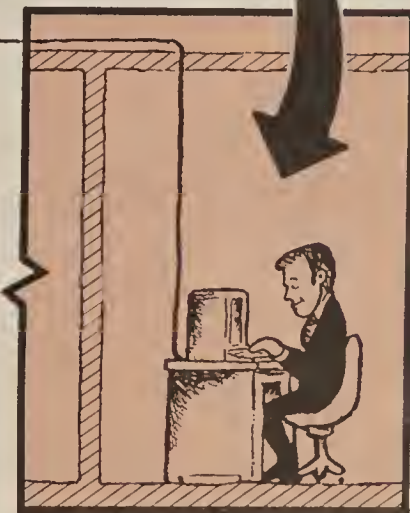
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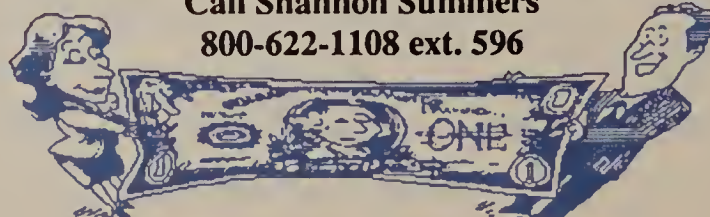
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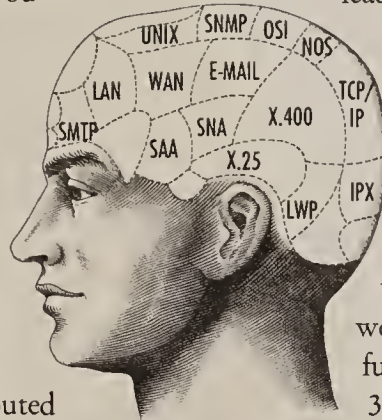
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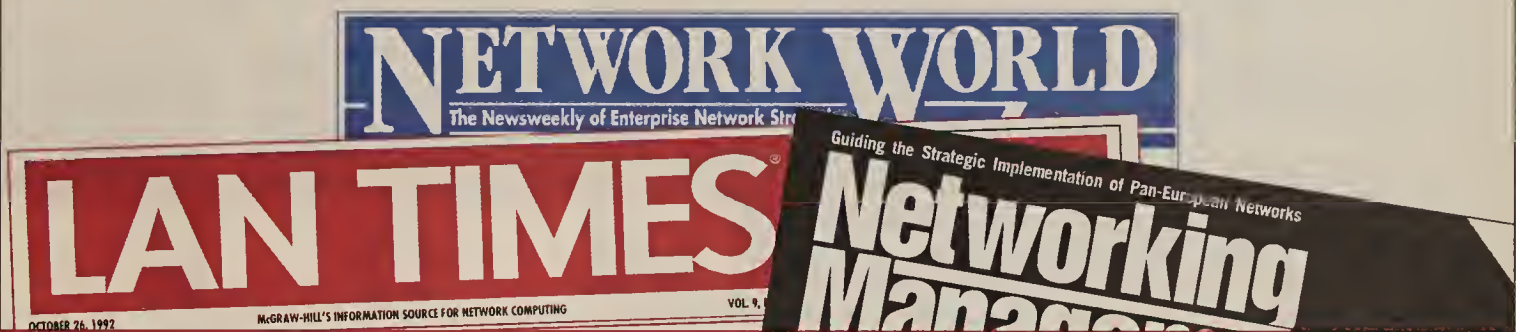
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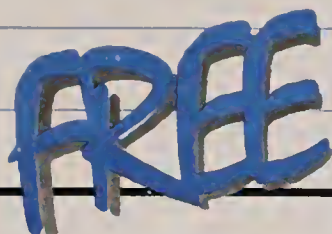


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Street Address.....

City..... State..... Zip.....

Is this your Business Address? Yes ☐ No ☐  
Please Answer **ALL** Questions, Sign and Date the Form.

### 1 Industry: (check one only)

01. ☐ Manufacturers (other than Computer/Communications)
02. ☐ Finance/Banking
03. ☐ Insurance
04. ☐ Real Estate
05. ☐ Healthcare Services
06. ☐ Legal
07. ☐ Hospitality
08. ☐ Retail/Wholesale Trade/Business Services
09. ☐ Transportation
10. ☐ Utilities
11. ☐ Education
12. ☐ Process Industries (Mining/Construction/  
Petroleum Refining/Agriculture/Forestry)
13. ☐ Government, State/Local
14. ☐ Government, Federal
15. ☐ Military
16. ☐ Aerospace
17. ☐ Consultants (Independent)
18. ☐ Carriers
19. ☐ Interconnects
20. ☐ Manufacturers (Computer/Communications)
21. ☐ VAR/VAD/VAN/ Systems Houses
22. ☐ Distributors, Computer Related
23. ☐ Distributors, Communications Related
24. ☐ Other

### 2 What is your job function? (check one only)

#### NETWORKING MANAGEMENT

1. ☐ Networking Mgmt.
2. ☐ LAN Mgmt.
3. ☐ Datacom/Telecom Mgmt.
4. ☐ Engineering Mgmt.

#### MIS MANAGEMENT

5. ☐ MIS, IS, IT Mgmt.
6. ☐ Engineering Mgmt.

#### CORPORATE MANAGEMENT

7. ☐ Corporate Mgmt. (CIO, CEO, Pres., VP, Dir., Mgr., Financial Mgmt.)
8. ☐ Consultant (Independent)
9. ☐ Other

### 3 My responsibilities include: (check one only)

1. ☐ LANs/ Internetworking/ WANs
2. ☐ LANs/ Internetworking
3. ☐ LANs
4. ☐ WANs
5. ☐ None

### 4 What is the total number of sites for which you have purchase influence? (check one only)

1. ☐ 100+
2. ☐ 50 - 99
3. ☐ 20 - 49
4. ☐ 10 - 19
5. ☐ 2 - 9
6. ☐ 1
7. ☐ None

### 5 What is your scope and involvement in purchasing decisions for network products & services for your enterprise?

- |   |   |
|---|---|
| <b>A. Scope</b><br>(check one only)         | <b>B. Involvement</b><br>(check all that apply) |
| 1. <input type="checkbox"/> Corporatewide   | 1. <input type="checkbox"/> Recommend/Specify   |
| 2. <input type="checkbox"/> Multienterprise | 2. <input type="checkbox"/> Approve             |
| 3. <input type="checkbox"/> Departmental    | 3. <input type="checkbox"/> Evaluate            |
|   | 4. <input type="checkbox"/> None (A or B)       |

### 6 Check all that apply in Columns A and B:

- A. I am involved in the purchase of the following products/services.  
B. I plan to purchase the following products/services in the next year.

- | Involved  | Plan to Purchase  |
|---|---|
| <b>A</b>  | <b>B LOCAL-AREA NETWORKS</b>  |
| <input type="checkbox"/> 01. <input type="checkbox"/> Local-Area Networks   | <input type="checkbox"/> 01. <input type="checkbox"/> Local-Area Networks   |
| <input type="checkbox"/> 02. <input type="checkbox"/> LAN Servers   | <input type="checkbox"/> 02. <input type="checkbox"/> LAN Servers   |
| <input type="checkbox"/> 03. <input type="checkbox"/> LAN Operating Systems Software  | <input type="checkbox"/> 03. <input type="checkbox"/> LAN Operating Systems Software  |
| <input type="checkbox"/> 04. <input type="checkbox"/> Superservers  | <input type="checkbox"/> 04. <input type="checkbox"/> Superservers  |
| <input type="checkbox"/> 05. <input type="checkbox"/> Data Base Servers (Oracle, Sybase, etc.)                                  | <input type="checkbox"/> 05. <input type="checkbox"/> Data Base Servers (Oracle, Sybase, etc.)                                  |
| <input type="checkbox"/> 06. <input type="checkbox"/> Terminal Servers  | <input type="checkbox"/> 06. <input type="checkbox"/> Terminal Servers  |
| <input type="checkbox"/> 07. <input type="checkbox"/> LAN Services  | <input type="checkbox"/> 07. <input type="checkbox"/> LAN Services  |
| <input type="checkbox"/> 08. <input type="checkbox"/> LAN Storage Devices (optical, tape, disk, etc., including backup systems) | <input type="checkbox"/> 08. <input type="checkbox"/> LAN Storage Devices (optical, tape, disk, etc., including backup systems) |
| <input type="checkbox"/> 09. <input type="checkbox"/> Network Test Equipment  | <input type="checkbox"/> 09. <input type="checkbox"/> Network Test Equipment  |
| <input type="checkbox"/> 10. <input type="checkbox"/> Hubs  | <input type="checkbox"/> 10. <input type="checkbox"/> Hubs  |
| <input type="checkbox"/> 11. <input type="checkbox"/> Cables, Connectors, Baluns  | <input type="checkbox"/> 11. <input type="checkbox"/> Cables, Connectors, Baluns  |
| <input type="checkbox"/> 12. <input type="checkbox"/> UPS   | <input type="checkbox"/> 12. <input type="checkbox"/> UPS   |
| <input type="checkbox"/> 13. <input type="checkbox"/> Network Adapter Boards  | <input type="checkbox"/> 13. <input type="checkbox"/> Network Adapter Boards  |
| <input type="checkbox"/> 14. <input type="checkbox"/> Peer-to-Peer LANs   | <input type="checkbox"/> 14. <input type="checkbox"/> Peer-to-Peer LANs   |
| <input type="checkbox"/> 15. <input type="checkbox"/> Wireless LANs   | <input type="checkbox"/> 15. <input type="checkbox"/> Wireless LANs   |
| <input type="checkbox"/> 16. <input type="checkbox"/> SNMP Network Management   | <input type="checkbox"/> 16. <input type="checkbox"/> SNMP Network Management   |
| <input type="checkbox"/> 17. <input type="checkbox"/> ATM (Asynchronous Transfer Mode)  | <input type="checkbox"/> 17. <input type="checkbox"/> ATM (Asynchronous Transfer Mode)  |
| <b>A</b>  | <b>B INTERNETWORKING</b>  |
| <input type="checkbox"/> 18. <input type="checkbox"/> Bridges   | <input type="checkbox"/> 18. <input type="checkbox"/> Bridges   |
| <input type="checkbox"/> 19. <input type="checkbox"/> Routers   | <input type="checkbox"/> 19. <input type="checkbox"/> Routers   |
| <input type="checkbox"/> 20. <input type="checkbox"/> Gateways  | <input type="checkbox"/> 20. <input type="checkbox"/> Gateways  |
| <input type="checkbox"/> 21. <input type="checkbox"/> Bridge/Routers  | <input type="checkbox"/> 21. <input type="checkbox"/> Bridge/Routers  |
| <input type="checkbox"/> 22. <input type="checkbox"/> Hubs  | <input type="checkbox"/> 22. <input type="checkbox"/> Hubs  |
| <input type="checkbox"/> 23. <input type="checkbox"/> Intelligent Hubs  | <input type="checkbox"/> 23. <input type="checkbox"/> Intelligent Hubs  |
| <input type="checkbox"/> 24. <input type="checkbox"/> Communications Servers  | <input type="checkbox"/> 24. <input type="checkbox"/> Communications Servers  |

### Involved Plan to Purchase

- |   |   |
|---|---|
| <b>A</b>  | <b>B COMPUTERS/PERIPHERALS</b>  |
| <input type="checkbox"/> 25. <input type="checkbox"/> Micros/PCs                    | <input type="checkbox"/> 25. <input type="checkbox"/> Micros/PCs                    |
| <input type="checkbox"/> 26. <input type="checkbox"/> Minis                         | <input type="checkbox"/> 26. <input type="checkbox"/> Minis                         |
| <input type="checkbox"/> 27. <input type="checkbox"/> Mainframes                    | <input type="checkbox"/> 27. <input type="checkbox"/> Mainframes                    |
| <input type="checkbox"/> 28. <input type="checkbox"/> Pen-Based                     | <input type="checkbox"/> 28. <input type="checkbox"/> Pen-Based                     |
| <input type="checkbox"/> 29. <input type="checkbox"/> Laptops                       | <input type="checkbox"/> 29. <input type="checkbox"/> Laptops                       |
| <input type="checkbox"/> 30. <input type="checkbox"/> Workstations                  | <input type="checkbox"/> 30. <input type="checkbox"/> Workstations                  |
| <input type="checkbox"/> 31. <input type="checkbox"/> Image Processing Workstations | <input type="checkbox"/> 31. <input type="checkbox"/> Image Processing Workstations |
| <input type="checkbox"/> 32. <input type="checkbox"/> Front-End Processors          | <input type="checkbox"/> 32. <input type="checkbox"/> Front-End Processors          |
| <input type="checkbox"/> 33. <input type="checkbox"/> Terminals                     | <input type="checkbox"/> 33. <input type="checkbox"/> Terminals                     |
| <input type="checkbox"/> 34. <input type="checkbox"/> Printers                      | <input type="checkbox"/> 34. <input type="checkbox"/> Printers                      |
| <input type="checkbox"/> 35. <input type="checkbox"/> Cluster Controllers           | <input type="checkbox"/> 35. <input type="checkbox"/> Cluster Controllers           |
| <input type="checkbox"/> 36. <input type="checkbox"/> Fax Machines                  | <input type="checkbox"/> 36. <input type="checkbox"/> Fax Machines                  |
| <input type="checkbox"/> 37. <input type="checkbox"/> X-Terminals                   | <input type="checkbox"/> 37. <input type="checkbox"/> X-Terminals                   |

- |  |  |
|--|--|
| <b>A</b>   | <b>B SOFTWARE/APPLICATIONS</b>   |
| <input type="checkbox"/> 38. <input type="checkbox"/> Network Management                     | <input type="checkbox"/> 38. <input type="checkbox"/> Network Management                     |
| <input type="checkbox"/> 39. <input type="checkbox"/> Micro to Mainframe                     | <input type="checkbox"/> 39. <input type="checkbox"/> Micro to Mainframe                     |
| <input type="checkbox"/> 40. <input type="checkbox"/> Security                               | <input type="checkbox"/> 40. <input type="checkbox"/> Security                               |
| <input type="checkbox"/> 41. <input type="checkbox"/> Communication/Terminal Emulation       | <input type="checkbox"/> 41. <input type="checkbox"/> Communication/Terminal Emulation       |
| <input type="checkbox"/> 42. <input type="checkbox"/> Word Processing                        | <input type="checkbox"/> 42. <input type="checkbox"/> Word Processing                        |
| <input type="checkbox"/> 43. <input type="checkbox"/> Operating Systems                      | <input type="checkbox"/> 43. <input type="checkbox"/> Operating Systems                      |
| <input type="checkbox"/> 44. <input type="checkbox"/> Business Applications (Finance/Mfg/HR) | <input type="checkbox"/> 44. <input type="checkbox"/> Business Applications (Finance/Mfg/HR) |
| <input type="checkbox"/> 45. <input type="checkbox"/> Applications Development               | <input type="checkbox"/> 45. <input type="checkbox"/> Applications Development               |
| <input type="checkbox"/> 46. <input type="checkbox"/> Data Base Management                   | <input type="checkbox"/> 46. <input type="checkbox"/> Data Base Management                   |
| <input type="checkbox"/> 47. <input type="checkbox"/> Spreadsheet                            | <input type="checkbox"/> 47. <input type="checkbox"/> Spreadsheet                            |
| <input type="checkbox"/> 48. <input type="checkbox"/> Groupware                              | <input type="checkbox"/> 48. <input type="checkbox"/> Groupware                              |
| <input type="checkbox"/> 49. <input type="checkbox"/> EDI                                    | <input type="checkbox"/> 49. <input type="checkbox"/> EDI                                    |
| <input type="checkbox"/> 50. <input type="checkbox"/> E-Mail                                 | <input type="checkbox"/> 50. <input type="checkbox"/> E-Mail                                 |
| <input type="checkbox"/> 51. <input type="checkbox"/> Windows/Graphical User Interface       | <input type="checkbox"/> 51. <input type="checkbox"/> Windows/Graphical User Interface       |
| <input type="checkbox"/> 52. <input type="checkbox"/> 4GL/Development                        | <input type="checkbox"/> 52. <input type="checkbox"/> 4GL/Development                        |
| <input type="checkbox"/> 53. <input type="checkbox"/> Multimedia                             | <input type="checkbox"/> 53. <input type="checkbox"/> Multimedia                             |
| <input type="checkbox"/> 54. <input type="checkbox"/> Graphics                               | <input type="checkbox"/> 54. <input type="checkbox"/> Graphics                               |
| <input type="checkbox"/> 55. <input type="checkbox"/> Utilities                              | <input type="checkbox"/> 55. <input type="checkbox"/> Utilities                              |

- |  |  |
|--|--|
| <b>A</b>   | <b>B WIDE-AREA NETWORK EQUIPMENT/SERVICES</b>  |
| <input type="checkbox"/> 56. <input type="checkbox"/> Modems (9.6K bps and over)       | <input type="checkbox"/> 56. <input type="checkbox"/> Modems (9.6K bps and over)       |
| <input type="checkbox"/> 57. <input type="checkbox"/> Modems (under 9.6K bps)          | <input type="checkbox"/> 57. <input type="checkbox"/> Modems (under 9.6K bps)          |
| <input type="checkbox"/> 58. <input type="checkbox"/> T-1                              | <input type="checkbox"/> 58. <input type="checkbox"/> T-1                              |
| <input type="checkbox"/> 59. <input type="checkbox"/> T-3                              | <input type="checkbox"/> 59. <input type="checkbox"/> T-3                              |
| <input type="checkbox"/> 60. <input type="checkbox"/> Fractional T-1                   | <input type="checkbox"/> 60. <input type="checkbox"/> Fractional T-1                   |
| <input type="checkbox"/> 61. <input type="checkbox"/> Data Switches                    | <input type="checkbox"/> 61. <input type="checkbox"/> Data Switches                    |
| <input type="checkbox"/> 62. <input type="checkbox"/> SMDS                             | <input type="checkbox"/> 62. <input type="checkbox"/> SMDS                             |
| <input type="checkbox"/> 63. <input type="checkbox"/> ATM (Asynchronous Transfer Mode) | <input type="checkbox"/> 63. <input type="checkbox"/> ATM (Asynchronous Transfer Mode) |
| <input type="checkbox"/> 64. <input type="checkbox"/> Matrix Switches                  | <input type="checkbox"/> 64. <input type="checkbox"/> Matrix Switches                  |
| <input type="checkbox"/> 65. <input type="checkbox"/> Packet Switches                  | <input type="checkbox"/> 65. <input type="checkbox"/> Packet Switches                  |
| <input type="checkbox"/> 66. <input type="checkbox"/> Protocol Converters              | <input type="checkbox"/> 66. <input type="checkbox"/> Protocol Converters              |
| <input type="checkbox"/> 67. <input type="checkbox"/> Diagnostic/Test Equipment        | <input type="checkbox"/> 67. <input type="checkbox"/> Diagnostic/Test Equipment        |
| <input type="checkbox"/> 68. <input type="checkbox"/> DSU/CSUs                         | <input type="checkbox"/> 68. <input type="checkbox"/> DSU/CSUs                         |
| <input type="checkbox"/> 69. <input type="checkbox"/> Microwave                        | <input type="checkbox"/> 69. <input type="checkbox"/> Microwave                        |
| <input type="checkbox"/> 70. <input type="checkbox"/> Fax Boards/Modems                | <input type="checkbox"/> 70. <input type="checkbox"/> Fax Boards/Modems                |
| <input type="checkbox"/> 71. <input type="checkbox"/> VSAT                             | <input type="checkbox"/> 71. <input type="checkbox"/> VSAT                             |
| <input type="checkbox"/> 72. <input type="checkbox"/> Fiber Optic                      | <input type="checkbox"/> 72. <input type="checkbox"/> Fiber Optic                      |
| <input type="checkbox"/> 73. <input type="checkbox"/> Satellite                        | <input type="checkbox"/> 73. <input type="checkbox"/> Satellite                        |
| <input type="checkbox"/> 74. <input type="checkbox"/> ISDN                             | <input type="checkbox"/> 74. <input type="checkbox"/> ISDN                             |
| <input type="checkbox"/> 75. <input type="checkbox"/> PBXs (over 1000 lines)           | <input type="checkbox"/> 75. <input type="checkbox"/> PBXs (over 1000 lines)           |
| <input type="checkbox"/> 76. <input type="checkbox"/> PBXs (under 1000 lines)          | <input type="checkbox"/> 76. <input type="checkbox"/> PBXs (under 1000 lines)          |
| <input type="checkbox"/> 77. <input type="checkbox"/> Automatic Call Distributors      | <input type="checkbox"/> 77. <input type="checkbox"/> Automatic Call Distributors      |
| <input type="checkbox"/> 78. <input type="checkbox"/> Voice Messaging Systems          | <input type="checkbox"/> 78. <input type="checkbox"/> Voice Messaging Systems          |
| <input type="checkbox"/> 79. <input type="checkbox"/> Videoconferencing Systems        | <input type="checkbox"/> 79. <input type="checkbox"/> Videoconferencing Systems        |
| <input type="checkbox"/> 80. <input type="checkbox"/> Voice Response/Processing        | <input type="checkbox"/> 80. <input type="checkbox"/> Voice Response/Processing        |
| <input type="checkbox"/> 81. <input type="checkbox"/> Switched Voice                   | <input type="checkbox"/> 81. <input type="checkbox"/> Switched Voice                   |
| <input type="checkbox"/> 82. <input type="checkbox"/> Dedicated Leased Line            | <input type="checkbox"/> 82. <input type="checkbox"/> Dedicated Leased Line            |
| <input type="checkbox"/> 83. <input type="checkbox"/> Switched Data                    | <input type="checkbox"/> 83. <input type="checkbox"/> Switched Data                    |
| <input type="checkbox"/> 84. <input type="checkbox"/> Centrex                          | <input type="checkbox"/> 84. <input type="checkbox"/> Centrex                          |
| <input type="checkbox"/> 85. <input type="checkbox"/> E-Mail/On-Line Information       | <input type="checkbox"/> 85. <input type="checkbox"/> E-Mail/On-Line Information       |
| <input type="checkbox"/> 86. <input type="checkbox"/> Image Processing                 | <input type="checkbox"/> 86. <input type="checkbox"/> Image Processing                 |
| <input type="checkbox"/> 87. <input type="checkbox"/> Audio Teleconferencing           | <input type="checkbox"/> 87. <input type="checkbox"/> Audio Teleconferencing           |
| <input type="checkbox"/> 88. <input type="checkbox"/> Local Services                   | <input type="checkbox"/> 88. <input type="checkbox"/> Local Services                   |
| <input type="checkbox"/> 89. <input type="checkbox"/> WATS MTs                         | <input type="checkbox"/> 89. <input type="checkbox"/> WATS MTs                         |
| <input type="checkbox"/> 90. <input type="checkbox"/> International                    | <input type="checkbox"/> 90. <input type="checkbox"/> International                    |
| <input type="checkbox"/> 91. <input type="checkbox"/> Virtual Networks                 | <input type="checkbox"/> 91. <input type="checkbox"/> Virtual Networks                 |
| <input type="checkbox"/> 92. <input type="checkbox"/> Frame Relay                      | <input type="checkbox"/> 92. <input type="checkbox"/> Frame Relay                      |
| <input type="checkbox"/> 93. <input type="checkbox"/> Value Added Services             | <input type="checkbox"/> 93. <input type="checkbox"/> Value Added Services             |
| <input type="checkbox"/> XX. <input type="checkbox"/> None of the above (1-93)         | <input type="checkbox"/> XX. <input type="checkbox"/> None of the above (1-93)         |

### 7 What is the total number of A: LANs B: Workstations/Nodes in your entire organization?

- | LANs   | Workstations/<br>Nodes   |
|--|--|
| <b>A</b>   | <b>B</b>   |
| <input type="checkbox"/> 1. <input type="checkbox"/> 5,000+        | <input type="checkbox"/> 1. <input type="checkbox"/> 5,000+        |
| <input type="checkbox"/> 2. <input type="checkbox"/> 1,000 - 4,999 | <input type="checkbox"/> 2. <input type="checkbox"/> 1,000 - 4,999 |
| <input type="checkbox"/> 3. <input type="checkbox"/> 100 - 999     | <input type="checkbox"/> 3. <input type="checkbox"/> 100 - 999     |
| <input type="checkbox"/> 4. <input type="checkbox"/> 50 - 99       | <input type="checkbox"/> 4. <input type="checkbox"/> 50 - 99       |
| <input type="checkbox"/> 5. <input type="checkbox"/> 10 - 49       | <input type="checkbox"/> 5. <input type="checkbox"/> 10 - 49       |
| <input type="checkbox"/> 6. <input type="checkbox"/> 9 or Less     | <input type="checkbox"/> 6. <input type="checkbox"/> 9 or Less     |

### 8 Which of the following network platforms are currently installed/planned in the next year?

- | Present  | Planned  |
|--|--|
| <input type="checkbox"/> 01. <input type="checkbox"/> SNA          | <input type="checkbox"/> 01. <input type="checkbox"/> SNA          |
| <input type="checkbox"/> 02. <input type="checkbox"/> DECNET       | <input type="checkbox"/> 02. <input type="checkbox"/> DECNET       |
| <input type="checkbox"/> 03. <input type="checkbox"/> MAP/TOP      | <input type="checkbox"/> 03. <input type="checkbox"/> MAP/TOP      |
| <input type="checkbox"/> 04. <input type="checkbox"/> TCP/IP       | <input type="checkbox"/> 04. <input type="checkbox"/> TCP/IP       |
| <input type="checkbox"/> 05. <input type="checkbox"/> DCA (Unisys) | <input type="checkbox"/> 05. <input type="checkbox"/> DCA (Unisys) |
| <input type="checkbox"/> 06. <input type="checkbox"/> X.25         | <input type="checkbox"/> 06. <input type="checkbox"/> X.25         |

### Present Planned

- |  |  |
|--|--|
| <input type="checkbox"/> 07. <input type="checkbox"/> NOVELL IPX/SPX   | <input type="checkbox"/> 07. <input type="checkbox"/> NOVELL IPX/SPX   |
| <input type="checkbox"/> 08. <input type="checkbox"/> APPC/APPN/LU 6.2 | <input type="checkbox"/> 08. <input type="checkbox"/> APPC/APPN/LU 6.2 |
| <input type="checkbox"/> 09. <input type="checkbox"/> NETBIOS          | <input type="checkbox"/> 09. <input type="checkbox"/> NETBIOS          |
| <input type="checkbox"/> 10. <input type="checkbox"/> OSI              | <input type="checkbox"/> 10. <input type="checkbox"/> OSI              |
| <input type="checkbox"/> 11. <input type="checkbox"/> APPLETALK        | <input type="checkbox"/> 11. <input type="checkbox"/> APPLETALK        |
| <input type="checkbox"/> 12. <input type="checkbox"/> OTHER            | <input type="checkbox"/> 12. <input type="checkbox"/> OTHER            |

### LAN OPERATING SYSTEM

- |   |   |
|---|---|
| <input type="checkbox"/> 13. <input type="checkbox"/> LOCALTALK (APPLETALK)           | <input type="checkbox"/> 13. <input type="checkbox"/> LOCALTALK (APPLETALK)           |
| <input type="checkbox"/> 14. <input type="checkbox"/> BANYAN (VINES)                  | <input type="checkbox"/> 14. <input type="checkbox"/> BANYAN (VINES)                  |
| <input type="checkbox"/> 15. <input type="checkbox"/> DCA (IRMLAN)                    | <input type="checkbox"/> 15. <input type="checkbox"/> DCA (IRMLAN)                    |
| <input type="checkbox"/> 16. <input type="checkbox"/> DCA (10-NET)                    | <input type="checkbox"/> 16. <input type="checkbox"/> DCA (10-NET)                    |
| <input type="checkbox"/> 17. <input type="checkbox"/> IBM (LAN SERVER)                | <input type="checkbox"/> 17. <input type="checkbox"/> IBM (LAN SERVER)                |
| <input type="checkbox"/> 18. <input type="checkbox"/> IBM (PC LAN PROGRAM)            | <input type="checkbox"/> 18. <input type="checkbox"/> IBM (PC LAN PROGRAM)            |
| <input type="checkbox"/> 19. <input type="checkbox"/> MICROSOFT (LAN MANAGER)         | <input type="checkbox"/> 19. <input type="checkbox"/> MICROSOFT (LAN MANAGER)         |
| <input type="checkbox"/> 20. <input type="checkbox"/> UNGERMANN-BASS (NET/1)          | <input type="checkbox"/> 20. <input type="checkbox"/> UNGERMANN-BASS (NET/1)          |
| <input type="checkbox"/> 21. <input type="checkbox"/> NOVELL (NETWARE, 2.X, 3.X, 4.X) | <input type="checkbox"/> 21. <input type="checkbox"/> NOVELL (NETWARE, 2.X, 3.X, 4.X) |
| <input type="checkbox"/> 22. <input type="checkbox"/> PROTEON (PRONET)                | <input type="checkbox"/> 22. <input type="checkbox"/> PROTEON (PRONET)                |
| <input type="checkbox"/> 23. <input type="checkbox"/> SITKA (TOPS)                    | <input type="checkbox"/> 23. <input type="checkbox"/> SITKA (TOPS)                    |
| <input type="checkbox"/> 24. <input type="checkbox"/> 3COM (3+, 3+OPEN)               | <input type="checkbox"/> 24. <input type="checkbox"/> 3COM (3+, 3+OPEN)               |
| <input type="checkbox"/> 25. <input type="checkbox"/> ARTISOFT (LANTASTIC)            | <input type="checkbox"/> 25. <input type="checkbox"/> ARTISOFT (LANTASTIC)            |
| <input type="checkbox"/> 26. <input type="checkbox"/> HAYES (LANSTEP)                 | <input type="checkbox"/> 26. <input type="checkbox"/> HAYES (LANSTEP)                 |
| <input type="checkbox"/> 27. <input type="checkbox"/> DEC (PATHWORKS)                 | <input type="checkbox"/> 27. <input type="checkbox"/> DEC (PATHWORKS)                 |
| <input type="checkbox"/> 28. <input type="checkbox"/> OTHER                           | <input type="checkbox"/> 28. <input type="checkbox"/> OTHER                           |

### LAN ENVIRONMENT

- |  |  |
|--|--|
| <input type="checkbox"/> 29. <input type="checkbox"/> 4M TOKEN RING  | <input type="checkbox"/> 29. <input type="checkbox"/> 4M TOKEN RING  |
| <input type="checkbox"/> 30. <input type="checkbox"/> 16M TOKEN RING | <input type="checkbox"/> 30. <input type="checkbox"/> 16M TOKEN RING |
| <input type="checkbox"/> 31. <input type="checkbox"/> ARCNET         | <input type="checkbox"/> 31. <input type="checkbox"/> ARCNET         |
| <input type="checkbox"/> 32. <input type="checkbox"/> ETHERNET       | <input type="checkbox"/> 32. <input type="checkbox"/> ETHERNET       |
| <input type="checkbox"/> 33. <input type="checkbox"/> STARLAN        | <input type="checkbox"/> 33. <input type="checkbox"/> STARLAN        |
| <input type="checkbox"/> 34. <input type="checkbox"/> FDDI           | <input type="checkbox"/> 34. <input type="checkbox"/> FDDI           |
| <input type="checkbox"/> 35. <input type="checkbox"/> LOCALTALK      | <input type="checkbox"/> 35. <input type="checkbox"/> LOCALTALK      |
| <input type="checkbox"/> 36. <input type="checkbox"/> 10BASE-T       | <input type="checkbox"/> 36. <input type="checkbox"/> 10BASE-T       |
| <input type="checkbox"/> 37. <input type="checkbox"/> OTHER          | <input type="checkbox"/> 37. <input type="checkbox"/> OTHER          |

### OPERATING SYSTEM

- |  |  |
|--|--|
| <input type="checkbox"/> 38. <input type="checkbox"/> DOS            | <input type="checkbox"/> 38. <input type="checkbox"/> DOS            |
| <input type="checkbox"/> 39. <input type="checkbox"/> UNIX/XENIX/AIX | <input type="checkbox"/> 39. <input type="checkbox"/> UNIX/XENIX/AIX |
| <input type="checkbox"/> 40. <input type="checkbox"/> OS/2           | <input type="checkbox"/> 40. <input type="checkbox"/> OS/2           |
| <input type="checkbox"/> 41. <input type="checkbox"/> OS/2 2.X       | <input type="checkbox"/> 41. <input type="checkbox"/> OS/2 2.X       |
| <input type="checkbox"/> 42. <input type="checkbox"/> MVS            | <input type="checkbox"/> 42. <input type="checkbox"/> MVS            |
| <input type="checkbox"/> 43. <input type="checkbox"/> VM             | <input type="checkbox"/> 43. <input type="checkbox"/> VM             |
| <input type="checkbox"/> 44. <input type="checkbox"/> VMS            | <input type="checkbox"/> 44. <input type="checkbox"/> VMS            |
| <input type="checkbox"/> 45. <input type="checkbox"/> MACINTOSH      | <input type="checkbox"/> 45. <input type="checkbox"/> MACINTOSH      |
| <input type="checkbox"/> 46. <input type="checkbox"/> WINDOWS        | <input type="checkbox"/> 46. <input type="checkbox"/> WINDOWS        |
| <input type="checkbox"/> 47. <input type="checkbox"/> WINDOWS NT     | <input type="checkbox"/> 47. <input type="checkbox"/> WINDOWS NT     |
| <input type="checkbox"/> 48. <input type="checkbox"/> X WINDOWS      | <input type="checkbox"/> 48. <input type="checkbox"/> X WINDOWS      |
| <input type="checkbox"/> 49. <input type="checkbox"/> OTHER          | <input type="checkbox"/> 49. <input type="checkbox"/> OTHER          |

### 9 For which areas outside of the U.S. do you have purchase influence? (check all that apply)

- |   |   |
|---|---|
| 1. <input type="checkbox"/> Europe        | 4. <input type="checkbox"/> Australia   |
| 2. <input type="checkbox"/> Asia          | 5. <input type="checkbox"/> Middle East |
| 3. <input type="checkbox"/> South America | 6. <input type="checkbox"/> None        |

### 10 Which of the following hardware platforms is installed/planned in your company? (check all that apply)

	Mainframes Currently Installed	Planned Next Year	Minis Currently Installed	Planned Next Year
01. DEC	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
02. IBM	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
03. AMDAHL	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
04. AT&T	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
05. BULL HNIS	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
06. DATA GENERAL	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
07. HP	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
08. TANDEM	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
09. UNISYS	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10. OTHER	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

### MICROCOMPUTERS (fill in the numbers)

	NUMBER INSTALLED	NUMBER PLANNED NEXT YEAR
11. MACINTOSH 20, 30, 40		
12. MACINTOSH OTHER		
13. PCs BASED ON 80586	N/A	
14. PCs BASED ON 80486		
15. PCs BASED ON 80386		
16. PCs BASED ON 80286		
17. PCs BASED ON 8086/8088		
18. RISC / UNIX BASED WKSTNS		
19. OTHER		

### 11 Estimated value of networking equipment and services:

- A. Which you helped specify, recommended or approved in the last year?  
B. Which you plan to help specify, recommend or approve in the next year?

- |   |   |
|---|---|
| <b>A</b>  | <b>B</b>  |
| <input type="checkbox"/> 1. <input type="checkbox"/> \$100 million and over | <input type="checkbox"/> 1. <input type="checkbox"/> \$100 million and over |
|   |   |



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# ISDN steals spotlight at TRIP '92

continued from page 1

"What's important here is the ISDN infrastructure, which will remain after the event," said Jim Jacobson, cochairman of the TRIP '92 organizing committee and supervisor of institutional telecommunications and office automation for Jet Propulsion Laboratory — a longtime ISDN user and a TRIP '92 participant. "It will enable the rapid development and roll-out of [additional] ISDN equipment and services."

As part of the event, 70 ISDN users — including dozens of vendors and carriers that call themselves users — will throw open their doors so that prospective customers can view production ISDN applications.

Participants include JCPenney Company, Inc., General Motors Corp., Lawrence Livermore National Laboratory, Quantum Chemical Corp., West Virginia University (WVU) and Schindler Elevator Corp. (see graphic, this page).

Applications showcased will include local-area network bridging, remote host access, video-conferencing, telecommuting, imaging and Group IV facsimile.

"The transcontinental ISDN network aside, we want to come away from TRIP with a far larger user audience understanding the varied business applications of ISDN," said Jim Briggs, a telecommunications manager for Eastman Kodak Co. "That would be a big victory for the movement."

Most of the applications are being displayed with equipment and services that are commercially available, although some are

running on products that are scheduled to be available within six months, Jacobson said.

But that is not good enough for some ISDN users, who say that the regional Bell holding companies' failure to widely deploy ISDN has already dealt the technology a heavy blow.

"We still believe in ISDN as an enabling technology and use it to support several business applications," said Bob Valliere, a senior project manager for communications systems at JCPenney in Dallas. "The interexchange carriers have done their part as far as ISDN deployment is concerned, but the RBHCs haven't. And that has really hurt ISDN."

Earlier this year, the retailer froze indefinitely a plan to deploy Primary Rate Interface (PRI) at stores across the country because it could not get the RBHCs to roll out service fast enough and at a reasonable price ("High cost, low availability chill JCPenney ISDN plans," *NW*, March 16).

But even JCPenney still has hope that TRIP '92 will advance the cause of ISDN, a belief echoed by other users.

Daniel Briere, president of TeleChoice, Inc. in Montclair, N.J., said his firm surveyed a dozen ISDN users about the event and found they "hope it will move non-ISDN to the technology, a migration that would build volume and usage, and drive down prices of ISDN equipment and services."

The TRIP network itself will link 22 central office switches equipped with National ISDN 1-compatible software. The Big

Three long-distance carriers and Bell Canada will provide a huge number of lines between the switches. AT&T will use 1,500 ISDN PRI links and Accunet Switched 64 connections, and MCI Communications Corp. will provide roughly 600 links.

Of the central office switches, 14 are AT&T Network Systems 5ESS switches, six are Northern Telecom, Inc. DMS-100 switches and two are Siemens Stromberg-Carlson switches.

"Creating the TRIP infrastructure could represent the first major step in the evolution of a national ISDN network," said Jeffrey Fritz, a telecommunications engineer at WVU in Morgantown. "But the industry can't stop here; it has to get the job done."

WVU, a TRIP '92 participant, will be showcasing a LAN bridging application.

Fritz said the university will

use a single ISDN Basic Rate Interface (BRI) line to connect an Ethernet segment running Novell, Inc. Internetwork Packet Exchange (IPX) and Apple Computer, Inc. AppleTalk protocols with another segment running the same protocols at the University of Cincinnati. The nets will be bridged using a pair of 802.3-to-ISDN bridges, both of which use B channels.

JCPenney, another participant, will show how buyers in two offices with multimedia workstations can transmit images via Southwestern Bell Corp. ISDN BRI or PRI lines through MCI ISDN PRI service to Hong Kong Telecom International, Ltd., which will use a BRI link to forward the traffic to a workstation at JCPenney's site there. This enables the buyers to view prototype products before committing to mass purchases or shipments. □

## Selected TRIP '92 user open houses

User	Location	Applications
Appalachian State University	Boone, N.C.	1, 2
Defense Information Systems Agency	Reston, Va.	3, 4, 5
Delaware State College	Dover, Del.	1, 6, 7
Environmental Protection Agency	Washington, D.C.	8, 9, 10, 11
Fannie Mae	Washington, D.C.	3, 6, 9, 10, 12, 18
General Motors Corp.	Troy, Mich.	4, 13
Internal Revenue Service	Arlington, Va./Washington, D.C.	2, 3, 8, 12
JCPenney Company, Inc.	Dallas/Milwaukee/Hong Kong	4, 14, 18
Jersey City State College	Jersey City, N.J.	2, 18
Jet Propulsion Laboratory	Pasadena, Calif.	9, 15
Lawrence Livermore National Laboratory	Livermore, Calif.	6, 8, 9, 16, 17
Naval Air Weapons Station	China Lake, Calif.	2, 18
Quantum Chemical Corp.	Cincinnati	2
Schindler Elevator Corp.	Morristown, N.J.	3, 18, 19, 20, 21
University of Cincinnati	Cincinnati	17
University of Louisville	Louisville, Ky.	18, 22
U.S. Total Army Personnel Command	Alexandria, Va.	22
Veterans Administration	Washington, D.C.	22
West Virginia University	Morgantown, W.Va.	2, 3, 18
1. Distance learning	9. Desktop video	16. Host system connection
2. LAN bridging	10. Printer sharing	17. Teleconferencing
3. Desktop conferencing	11. Multipoint voice	18. Videoconferencing
4. Multimedia conferencing	12. File transfer	19. ANI/DNIS
5. Secure voice	13. PC access	20. Primary Rate Interface call-by-call
6. Modem pooling	14. Data transfer	21. Leased-line backup
7. Enhanced 911	15. Remote LAN connection	22. Imaging
8. Group IV fax		

SOURCE: CORPORATION FOR OPEN SYSTEMS INTERNATIONAL, MCLEAN, VA.

## Sun's server aimed at apps

continued from page 4

cessing power and capacity of a mainframe system but demand the flexibility of a system that can grow with them."

The SPARCcenter 2000 comes with a base configuration of two SuperSPARC processors on a single board, although nine more of these boards can be added to a single SPARCcenter 2000 machine.

Each board provides up to 512M bytes of memory, one high-speed SBus I/O channel and four expansion options for things such as extra memory. Fully loaded, the SPARCcenter 2000 offers as many as 10 independent SBus I/O channels providing more than 500M byte/sec of dedicated I/O throughput.

The new system comes standard with Sun's Solaris 32-bit operating system, providing symmetric multiprocessing across the 20 processors.

In its maximum configuration,

**T**he new system comes standard with Sun's Solaris 32-bit operating system.



the SPARCcenter 2000 supports up to 5G bytes of error correction code (ECC) memory, one terabyte of Small Computer System Interface storage and a maximum

of 3,000 nodes, and delivers about 2.2 billion instructions per second.

Database performance for a sample eight-processor system is about 500 transactions per second (TPS).

Before this release, Sun's highest end server was the SPARCserver 690 Model 54, which supported a maximum of four processors that provided about 250 TPS, 1G byte of ECC memory and a maximum of 1,000 nodes.

Sun said it is working with Com Systems, Inc., Informix Software, Inc., Oracle Corp., Software AG of North America, Inc. and Sybase, Inc. to make these companies' relational database products available on the SPARCcenter 2000.

With regard to management, Tivoli Systems, Inc. and Comput-

er Associates International, Inc. have said their respective Tivoli Management Environment and CA-Unicenter management products will be able to administer the SPARCcenter 2000. Sun has also signed an agreement with Legent Corp. to port its system management tools to the Sun SPARCserver and SPARCstation platforms.

Finally, Sun has signed an agreement with Storage Technology Corp. and Epoch Systems to jointly market high-end backup and retrieval products for the SPARCcenter 2000.

Regardless of the high performance, analysts agreed Sun has kept the price low on the new system. The SPARCcenter 2000 will be available in April, starting at \$95,000 for a two-processor configuration. An eight-processor system will cost \$266,200. □

## Lotus, Microsoft face off in mart

continued from page 4

ture hardware.

Intel's Indeo technology provides a new video capability called scalable performance, which allows the video application to take full advantage of the processor power available in the computer when creating the image and providing the best resolution.

When Video for Windows is used for video capturing, extra hardware is needed. By adding a video camera and an internal board using Intel's i750 video processor, Indeo technology allows users to record video on a personal computer, providing real-time, single-step video capture and compression with immediate playback.

Video for Windows software costs \$199 and is available immediately. Intel's Indeo technology is being licensed only to software vendors and developers.

### The Lotus end

Freelance Graphics for Windows Version 2.0 incorporates two new tools, Lotus Media Manager and Lotus Sounds, both of which employ the same user interface for viewing multimedia files.

Lotus Media Manager enables users to browse, preview and then embed multimedia files into Freelance Graphics for Windows documents or other applications that support Object Linking and Embedding (OLE) technology. These multimedia files can be stored on a hard disk in a user's workstation, an attached CDROM or a networked server.

Media Manager lets Freelance Graphics for Windows users browse through multimedia files and determine which contain text, sound, animation or video.

Users can then preview a multimedia file within Media Manager, instead of calling up separate programs to run each type of file. Using a pull-down menu, users simply choose which sound, video or animation clips or files they want to preview. Users can then embed the file into a Freelance Graphics for Windows document or any other OLE-ready application by clicking on a command.

Lotus Sound enables users to record sounds and embed them as objects into OLE-compliant files for later review. This would allow, for example, an executive to record a statement and include it as an object within a screen presentation or business memo.

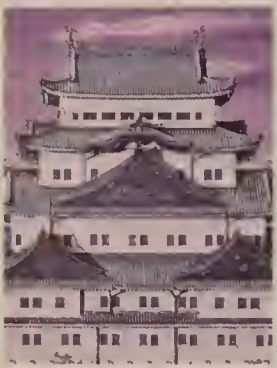
Freelance Graphics for Windows 2.0 will be available through resellers by the end of the year at a price of \$495 for a networked version and \$395 for a single-user version. □



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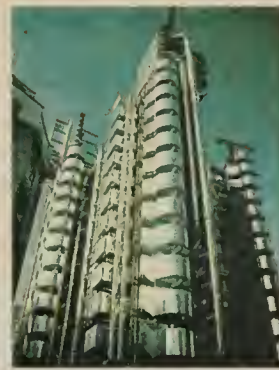
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*Photos in order of appearance: Castle of the Magician, Mexico (9th Century A.D.) — sacred man-made mountain imitating natural form. Lloyds of London Building, England (1986) — triumph of modern architecture. CN Tower, Canada (1976) — world's tallest freestanding structure at 533 meters (1,815 feet) high. Look to Quality — all Newbridge products and services meet international standards.*

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## Supporters say spectrum needed

*continued from page 2*

range, PCS can be used not just for phone calls, but for wireless LANs and private branch exchanges. Long-distance carriers are also hungrily eyeing it as an option for alternate local access.

PCS could also be supported in a lower range — around 800 MHz to 900 MHz — but may be limited to narrowband applications. A distinguishing feature of PCS is

**C**hoosing individual companies for hundreds of regional markets would be too slow.



its numbering plan in which a phone number is associated with an individual, rather than a location.

PCS, viewed as the next high-growth area in networking, has left the FCC struggling for over a year to sort out the issues of licensing, regulation and spectrum allocation.

The WIN Forum told the FCC its tentative decision issued last August to allocate only 20 MHz between 1,910 MHz and 1,930 MHz for unlicensed applications did not provide sufficient space for the operation of wireless LANs and PBXs.

"There is an immediate need for an initial allocation of at least 40 MHz to 65 MHz in the 2-GHz band for such services," said the WIN Forum. The group filed comments on the FCC's August order outlining how it intends to allocate spectrum and regulate the future PCS industry.

The FCC has proposed licensing up to five PCS carriers per market, with allocations of 20 MHz to 40 MHz per block in the 2-GHz range. But the unlicensed applications — such as wireless LANs or PBX systems — will be forced to operate in the narrow lower spectrum that is not contiguous with the licensed transmission systems.

The WIN Forum, which includes Apple Computer, Inc., AT&T, Cabletron Systems, Inc., Hewlett-Packard Co., IBM and Ungermann-Bass, Inc., said that unless there is sufficient unlicensed spectrum set aside at 2 GHz, there will be no technical "synergy" between what it calls unlicensed "User-PCSs" — such as wireless LANs — and licensed wireless PCS carrier services. That could create a problem, for example, in handing wireless LAN

traffic off to long-haul PCS providers.

Many WIN Forum members are counting on the close conjunction between User-PCSs and the licensed PCS services so they can develop products and services "that will make a seamless transition between the two."

The WIN Forum also said the FCC's tentative decision to allow unlicensed PCS operators to co-exist with fixed microwave stations was unrealistic due to the inevitable interference problems.

HP, in separate comments to the FCC, emphasized this point, saying, "In extensive research and discussions both within and outside the WIN Forum, no workable mechanism was encountered that would permit the sharing of spectrum between two uses exhibiting such diverse attributes as those of fixed microwave and unlicensed User-PCSs."

The FCC also received advice from the telecommunications industry on how it should proceed with handing out the carrier licenses for PCS and how the new industry should be regulated.

MCI suggested that the most effective way to assign licenses in an equitable manner would be for the FCC to hold comparative hearings for the selection of three national consortia to run competitive PCS operations throughout the U.S.

Choosing individual companies for hundreds of regional markets, as is done for the cellular market today, would be much too slow a process, MCI asserted.

According to MCI's plan, each consortia would need a national manager while many other companies would operate the local systems.

"We're saying MCI would step up to the role of national manager" but would not own a majority stake, noted Steve Zecola, vice-president of PCSs for MCI's consumer markets division. The national manager would provide network services, technical standards, national marketing and roaming, and interoperability among the systems.

MCI also suggested that since PCS is intended to promote competition in the cellular and local exchange markets, the FCC should take a "negative" view of participation or ownership of a consortium by local or cellular carriers. MCI added that the FCC should regulate the PCS consortia as common carriers, rather than as private carriers, since the law does not allow common carriers to be foreign-owned.

"We do not believe it is in the national interest to allow majority control by a foreign corporation of what could be a major telephone service in the United States in the future," MCI said in its comments. ▀

## Firms introduce new LAN scheme

*continued from page 2*

MAC protocol, and people were wondering whether it should be a whole new dot," said Brice Clark, referring to the way the Institute of Electrical and Electronics Engineers, Inc. names its protocols.

Clark is strategic planning manager for IIP's Roseville Networks Division in Roseville, Calif.

The 100Base-VG scheme works over four pairs of voice-grade unshielded twisted-pair wires. But where 10Base-T utilizes one pair of wires to transmit data and one pair to receive, leaving two pairs unused, the HP-AT&T scheme utilizes all four pairs to send and receive data.

The scheme is based on two new technologies — Quartet Signaling and the Demand Priority Access Method.

Quartet Signaling utilizes a new data encoding technique to deliver the 100M bit/sec throughput, according to HP. The technique, called 5B6B, uses a lower signaling frequency than schemes such as Crescendo Communications, Inc.'s Copper Distributed Data Interface method for running Fiber Distributed Data Interface over unshielded twisted pair.

As a result, it utilizes low-cost electronics while avoiding radio frequency emission and susceptibility problems. HP claims this enables it to support the same distances as 10Base-T Ethernet at a very low per-node cost (see graphic, this page).

Demand Priority eliminates the requirement that an end node be able to receive at the same time it transmits, which frees up

**“T**here really is a lot of common ground between HP, AT&T and 3Com,” Clark said.



the wire pairs for Quartet Signaling. This technology, which requires a hub-oriented star topology, allocates access to the network at the hub rather than at each of the connected nodes. It enables the hub to switch traffic for sending and receiving nodes, depending on the priority of the signal.

When a node wishes to transmit, it sends a request to the hub indicating the level of service required, either normal or high priority. The hub acknowledges the request, and the transmitting node begins sending packets. The

hub shoots the data to the destination based on address information in the packet. This provides for minimal delay, HP said.

If the hub receives more than one request at a time, it services the request with the highest priority first. This makes 100Base-VG a good alternative for applications such as multimedia, which require guaranteed bandwidth to the desktop, HP said. In addition, because the plan does not use CSMA/CD, performance does not degrade with utilization. Throughput increases uniformly until the hub becomes saturated.

Clark said HP-AT&T's three-hour presentation was well-received at the meeting, which was one of the largest held by the committee. According to Patricia

How 100Base-VG stacks up		
A comparison of the HP-AT&T Microelectronics proposal for 100M bit/sec Ethernet and CDDI.		
High-speed LAN alternatives	100Base-Voice Grade	Copper Distributed Data Interface
Transmission rate (bit/sec)	100M	100M
Distances supported (meters)		
• Data-grade UTP	150	100
• Voice-grade UTP	100	No support
Standard	IEEE (proposed)	ANSI (proposed)

Thaler, chairwoman of the IEEE 802.3 Committee, 125 people attended the meeting, which usually involves only the 30 voting members of the committee.

"There really is a lot of common ground between HP, AT&T and 3Com [which, together with LAN Media Corp. and other vendors, are proposing a different scheme]," Clark said. "We're all in agreement that the technology should support Category 3 cabling." Category 3 is the voice-grade, four-pair wiring.

Although LAN Media did present some factors that need to be weighed when determining a standard for the new technology, it did not make a technical proposal at the meeting.

Grand Junction Networks, Inc. was also scheduled to make a technical presentation to the committee, but its scheme is based on Category 5 data-grade wiring, and the focus of the meeting was Category 3.

"If a standard can support Category 3 cabling in a timely and cost-effective manner, that would be in the best interest of users," said Jack Moses, vice-president of Grand Junction in Union City, Calif. He said Grand Junction will support such a scheme if it becomes a standard. If not, Grand Junction is likely to present its proposal at an interim IEEE meeting Jan. 25.

Thaler said the committee hopes to have a standard wrapped up by March. ▀



## Workstation giants duel

*continued from page 1*

DEC unwrapped its first machines based on the company's new Alpha hardware architecture. Alpha claims the 64-bit Alpha microprocessors are the fastest in the world, and the company is banking on the Alpha architecture — successor to the VAX design — to lift the company out of its current financial doldrums.

DEC Alpha servers include two low-end configurations targeted for work group file, application and database sharing; a more powerful model that DEC described as a departmental server; and a so-called data center server for transaction processing and other heavy-duty applications.

The machines can be purchased alone or preconfigured as Advantage-Servers including CPU, memory, disk, tape, CDROM drive, installation services, a choice of DEC OpenVMS or OSF/1 operating systems, and Network Application Support (NAS) 300 software. NAS 300 includes DEC's Pathworks network operating system, DECnet, Open Systems Interconnection and Transmission Control Protocol/Internet Protocol stacks, X.400 messaging and other features.

DEC's low-end servers are the DEC 3000 AXP Server 400S and 500S, which are targeted at small

to midsize work groups.

The 400S features a 133-MHz Alpha microprocessor rated at 129.9 million instructions per second (MIPS). It has a 90M byte/sec I/O bus, three expansion slots, 32M bytes of random-access memory, a 1G-byte hard drive and a CDROM disk drive. It is priced starting at \$18,995, or \$20,720 in Advantage-Server configurations.

The 500S uses a 133-MHz Alpha chip rated at 146.7 MIPS and features a 100M byte/sec I/O bus, six expansion slots, 64M bytes of RAM, a 1G-byte hard drive and a CDROM disk drive. Prices start at \$41,195, or \$44,395 as an Advantage-Server.

At the departmental level, DEC unveiled uniprocessor and dual-processor versions of the DEC 4000 AXP Server. Both systems are based on a 160-MHz Alpha chip rated at 158.8 MIPS and feature a 160M byte/sec I/O bus, 64M bytes of RAM, a 1G-byte hard drive, and CDROM and tape drives. Prices start at \$77,000, or \$102,500 for Advantage-Servers.

The data center server is the DEC 7000 AXP, which is available in six models starting with the uniprocessor 610 and topping out at the six-processor 660. Each Alpha microprocessor in the

7000 AXP is clocked at 182 MHz and is rated at 177.3 MIPS. The Model 660 can pack 14G bytes of RAM and a 400M byte/sec bus.

Prices for the DEC 7000 AXP start at \$168,000 for the Model 610, which features 128Mbytes of RAM, a 1G-byte hard drive, and CDROM and tape drives. Advantage-Servers start at \$187,000. All servers are available now.

DEC also brought out DECnet Phase IV, OSI and X.25 software for the Alpha AXP's. The packages allow the Alpha systems to interoperate with DEC VAXes — as well as non-DEC systems — over DECnet, OSI and X.25 backbone networks.

HP's server announcement was not as sweeping as DEC's — HP only brought out one — nor was it as important to the company's future. But HP claimed that it, not DEC, owns the fastest RISC chip, and, hence, the most powerful server in the industry.

Along with its server introduction, HP announced a set of multimedia tools for its processors (see "HP joins multimedia blitz," this page).

The new HP Apollo 9000 Series Model 755 server houses the latest implementation of HP's PA-RISC technology, the 99-MHz PA-7100 chip. The 755 is rated at 124 MIPS and can run Novell, Inc.'s NetWare and AT&T/Microsoft Corp.'s LAN Manager for

## IBM shares plan for multimedia

*continued from page 4*

tools, through its Ultimedia Tool Series, as well as extensions to its Common User Access application services, to provide such facilities as virtual volume buttons, slide bars and other graphical data objects for controlling multimedia data streams.

■ **Data services.** The company plans to enable its Personal System/2, Application System/400 and ES/9000 platforms to act as clients or servers in distributed multimedia networks. It also plans to extend its relational databases to support multimedia data objects, as well as equip its storage management devices to

Unix network operating systems.

The server has a 20M byte/sec I/O bus and can support up to 768M bytes of RAM, four Extended Industry Standard Architecture expansion slots, and a total disk capacity of 295G bytes, including a 600M-byte CDROM drive and a tape drive.

Prices for the 755, which runs HP's HP-UX Unix operating system, start at \$54,995 for a configuration supporting 64M bytes of RAM and a 2G-byte hard drive. It will be available in the first quarter of 1993. ■

## HP joins multimedia blitz

CAMBRIDGE, Mass. — As part of its server rollout last week, Hewlett-Packard Co. unwrapped software that allows workstation users on a TCP/IP network to engage in work group video, audio and image conferencing.

HP's MPower software runs on the company's PA-RISC workstations and servers, the latest models of which debuted here last week. It also runs on HP's 700/RX line of X terminals and servers.

MPower allows those systems to share text, graphics and images in real time. It works over any network topology, including Ethernet, token-ring and Fiber Distributed Data Interface local-area networks, as well as wide-area links.

From a terminal or workstation running HP's Visual User Environment (VUE) interface, a user can conference with other users by clicking on an icon labeled HP Shared/X. Shared/X is the component of MPower that allows a user to share an X Window on the display with any other user on the network.

Users can engage in concurrent interactive sessions, such

as audio, video and image sharing and manipulation, by clicking on the appropriate icons for those services.

Other components of MPower include HP's Multimedia Mailer product, which allows users to include audio, image and video frames in electronic mail, and DeskScan/UX, which allows users to scan, view, manipulate, store and print high-resolution color and monochrome images.

SharedPrint/UX enables users to print color text, graphics and images to local or remote printers across a network by dragging and dropping an icon on the VUE printer icon. And MPower's VideoLive component provides real-time video playback in a window on the workstation screen and allows users to capture and store video frames for use in documentation or E-mail messages.

HP MPower is priced at \$495 for the client software and \$1,495 for the server. One server will support as many as 10 clients, HP said. The software will be available in the first quarter of 1993.

— Jim Duffy

## Borland finds allies in battle

*continued from page 6*

Sources said Borland, IBM, Novell and WordPerfect will develop a record-oriented extension to CLI, which they are calling Navigational CLI (NAV/CLI). The four vendors intend to work with SAG, X/Open Company, Ltd. and other industry groups to adopt NAV/CLI as a standard.

Borland is expected to release beta versions of an IDAPI software developers' kit for Windows and DOS environments in the first half of 1993, as well as an IDAPI driver for InterBase, its relational database that runs on Unix and other platforms.

Sometime next year, IBM and Novell are expected to release software developers' kits for OS/2 and NetWare, respectively. WordPerfect will incorporate IDAPI into WordPerfect InForms, an electronic and printed forms package, to provide access to multiple databases. Other vendors, such as Information Builders, Inc., are expected to announce support for IDAPI this week.

Kahn declined to mention all the vendors that are part of the IDAPI coalition, but he said Microsoft was not among them. Microsoft offers ODBC, a Win-

dows-based data access standard that is backed by a 40-vendor consortium.

Kahn said IDAPI provides richer functionality than ODBC, and he believes that users eventually will be able to run ODBC from IDAPI. Kahn added that he would welcome Microsoft's participation in IDAPI.

Not surprisingly, response from Microsoft was chilly.

"This [IDAPI] is a joke. It's strictly politics," said Lowell Tuttmann, a senior product manager for ODBC at Microsoft. "We don't want to have an API war with these guys. To ask us to join them when they don't even have a public specification is really twisting things around. Our specification has been public for over a year, and we have comments from 40 other database vendors that helped us write it."

Many analysts said the proliferation of standard database APIs is confusing users and serving only to perpetuate vendors' bottom line.

"These API wars are making life difficult for users who now have to choose between so-called standard APIs," said Herbert Edelstein, president of Euclid Associates in Potomac, Md. "This mess is caused by vendors who are scrambling for account control." ■

### NETWORK WORLD

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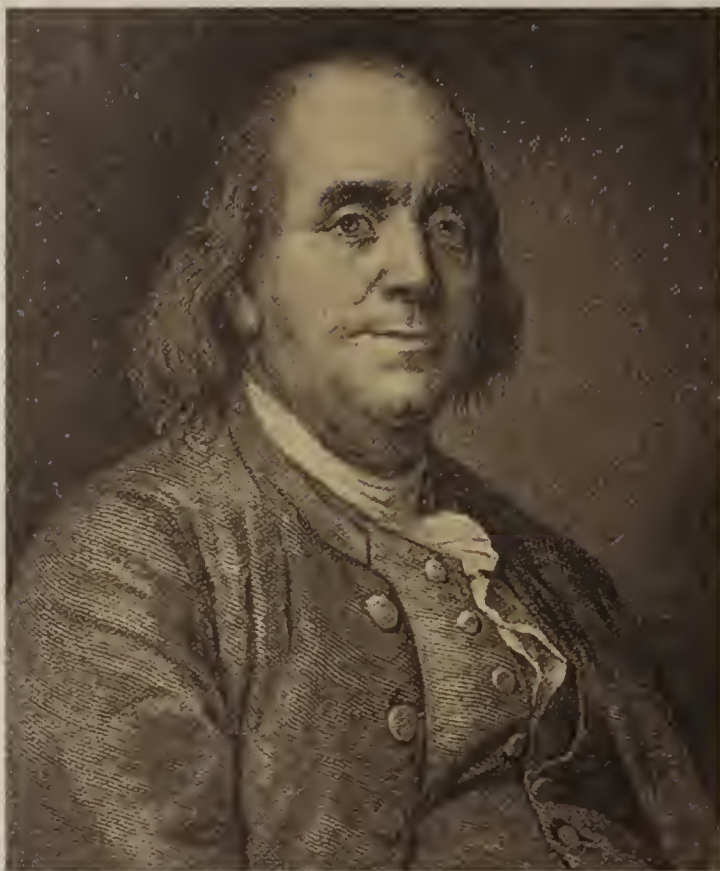
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Benjamin Franklin

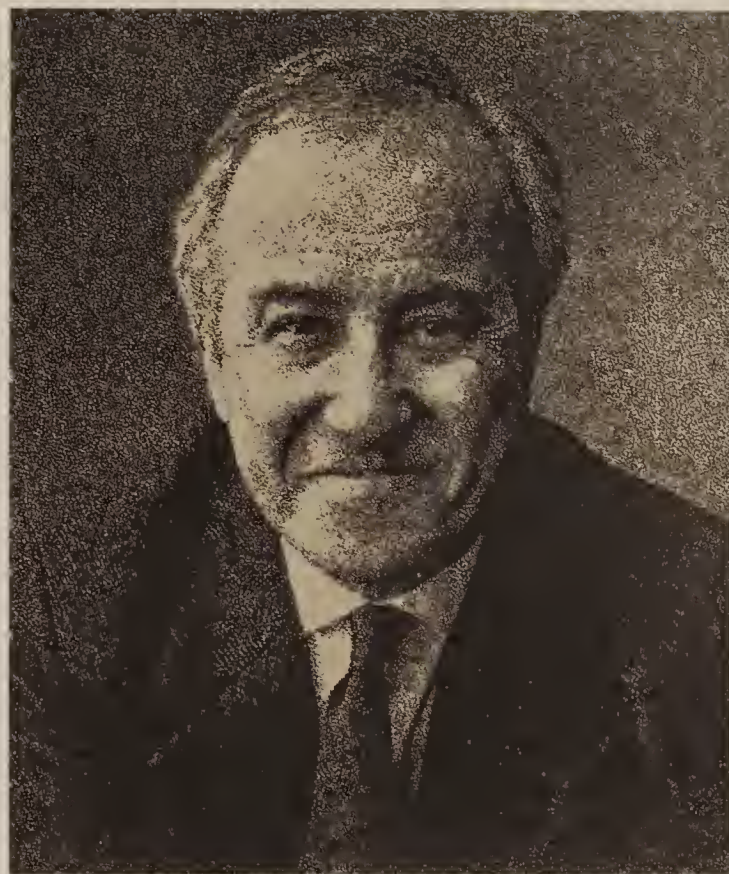


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